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MINISTRY OF FORESTS

North Coast Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective January 1, 2001

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Chief Forester

101-00540/

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the North Coast timber supply area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The North Coast TSA lies within the Prince Rupert Forest Region and is administered from the North Coast Forest District office in Prince Rupert. Following various reductions applied in the timber supply analysis, the land base assumed to contribute to timber harvesting was 119 130 hectares, or 6.1 percent of the total TSA area.

At the time of this determination, and as discussed in this rationale, the land base of the North Coast TSA is smaller than that assumed in the analysis as a result of the implementation of the Nisga'a Final Agreement (NFA) as well as district boundary changes which recently came into effect.

The North Coast TSA is bordered on the west by the Queen Charlotte TSA, which lies across Hecate Strait in the Pacific Ocean. To the east and inland lie the Nass and Kalum TSAs, as well as Tree Farm Licences (TFLs) 1, 41 and 25. The North Coast TSA is bordered to the south by the Mid Coast TSA, which lies in the Vancouver Forest Region.

There are a number of parks in and adjacent to the TSA, including Tweedsmuir Provincial Park to the south and Khutzeymateen Provincial Park northeast of Prince Rupert. Nisga'a Lands lie to the east of the TSA.

The North Coast TSA encompasses a diverse area, ranging from low floodplains around the many rivers and fjords to steep mountains topped by glaciers. The TSA contains three biogeoclimatic zones: Coastal Western Hemlock (CWH), Mountain Hemlock (MH) and Alpine Tundra (AT). The majority of the land base lies in the lower elevation CWH zone, characterized by high rainfall, cool summers and mild winters. The MH zone occupies the mid to upper elevation forested areas, and the AT zone lies at high elevations with clumps of trees interspersed with alpine tundra. The major tree species in the TSA are western hemlock, western redcedar, amabilis fir (balsam), sitka spruce and yellow cedar. Minor tree species in the TSA include shore pine (a variant of lodgepole pine), red alder and black cottonwood. The diverse forests provide habitat for many wildlife species, including grizzly and black bear, black-tailed deer, wolverine, fisher, porcupine, and numerous species of birds. The ocean inlets provide habitat for whales and salmon species.

The population in the North Coast TSA according to 1996 Statistics Canada data is 20 980 people. Approximately 84 percent of the population is concentrated in the city of Prince Rupert. Other communities include the District of Port Edward, Dodge Cove, Port Simpson, and villages of Kincolith, Greenville, Metlakatla, Oona River, Kitkatla, Hartley Bay and Kitsault.

The majority of the North Coast TSA is within the traditional lands of the Tsimshian First Nation. The Haisla also have traditional territories within the TSA, and the Heiltsuk and the Gitanyow have asserted their traditional interests within the district. Recently, the Nisga'a Final Agreement was implemented, which led to the transfer of some lands out of the North Coast TSA.

The major industries in the TSA have historically been commercial fishing and fish processing, although these industries have been in decline in recent years. Primary forestry and wood products as well as transportation are also of significance, and tourism is developing increased importance in the region.

Major licensees currently operating within the TSA are International Forest Products Limited, West Fraser Mills Limited, Thompson Industries Limited, and Boyle and Dean Logging Limited. Smaller operators have access to timber through the licences granted under the Small Business Forest Enterprise Program (SBFEP).

History of the AAC

The AAC for the North Coast TSA was determined in 1981 at 600 000 cubic metres. The harvest level was raised in 1987 to 700 000 cubic metres per year to accommodate two temporary timber sale licences issued for harvest of lands previously considered inoperable, with the aim of testing the use of experimental 'A' frame and skyline harvesting systems. The AAC was subsequently reduced in 1989 to 650 000 cubic metres when the first of the temporary licences expired, and again to 600 000 cubic metres in 1994 when the second licence expired. In July 1995, the AAC was determined at 600 000 cubic metres, which included 134 082 cubic metres allocated to the SBFEP.

As a result of the implementation of the Nisga'a Final Agreement in May 2000, approximately 61 000 hectares were removed from the gross land base of the North Coast TSA to become Nisga'a Lands. On May 12, 2000, under the authority of Part 14 of the *Forest Act*, I issued written orders for reductions in the AACs of the affected management units in response to the impacts of the transfer in ownership of land and forest resources to the Nisga'a Nation which resulted from the Nisga'a Final Agreement. These written orders included a reduction of 25 600 cubic metres in the AAC for the North Coast TSA to reflect the smaller land base. In this determination for the North Coast TSA, I will account for the permanent withdrawal of the area from the TSA and the contribution of the lands to the AAC.

The May 2000 reduction in the AAC was separate from my determination under section 8 of the *Forest Act.*

The harvestable volume for the area is currently apportioned by the Minister of Forests as follows (note that these numbers do not yet reflect the 25 600 cubic metres per year reduction under Part 14 of the *Forest Act*):

Apportionment	cubic metres/year	percentage
Forest Licences – replaceable (4)	438 918	73.2
Forest Licences – non-replaceable	15 000	2.5
SBFEP, any category (s. 20)	94 927	15.8
SBFEP, bid proposal (s. 21)	39 155	6.5
Forest Service Reserve	6 000	1.0
Woodlot Licences	6 000	1.0
Total	600 000	100.0

New AAC determination

Effective January 1, 2001 the new AAC for the North Coast TSA will 573 624 cubic metres, which includes one partition of 154 000 cubic metres to the following two portions of the TSA:

- that portion of the TSA which lies north of the Nass River, and
- that portion of the TSA which is considered highly visually sensitive (with recommended preservation, retention or partial retention VQOs).

This AAC excludes all volume allocated to woodlot licences issued since the previous determination for the North Coast TSA. This AAC will remain in effect until a new AAC is determined, which must take place within five years of the present determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the North Coast TSA include the following:

- *North Coast Timber Supply Area (TSA) Data Package and Information Report*, BCFS, 1998;
- *North Coast TSA Analysis Report*, BCFS, November 1999;
- *North Coast TSA Public Discussion Paper*, BCFS, November 1999;
- *North Coast TSA Summary of Public Input on Data Package and TSA Analysis Report,* BCFS, October 2000;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Letter from the Deputy Ministers of Forests and Environment, Lands and Parks (MELP), dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts on timber supply from biodiversity management;

- Letter from the chief forester to all licensees, dated May 12, 2000, regarding Allowable Annual Cut reductions for Tree Farm Licence 1 and the Kalum, Nass and North Coast Timber Supply Areas;
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS and MELP, including the AAC determination meeting held in Prince Rupert, March 8 and 9, 2000;
- *North Coast Timber Supply Analysis*, BCFS, January 1994;
- *North Coast Socio-Economic Analysis*, BCFS, October 1994;
- *North Coast TSA Rationale for AAC determination*, BCFS, July 6, 1995;
- *Forest Practices Code of British Columbia Act*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Act Regulations and Amendments*, consolidated to June 1999;
- *Forest Practices Code of British Columbia Guidebooks*, BCFS and MELP;
- *Biodiversity Guidebook*, Province of British Columbia (B.C.), September 1995;
- *Riparian Management Area Guidebook*, B.C., October 1996;
- *Community Watershed Guidebook*, B.C., October 1996;
- *Landscape Unit Planning Guide*, BCFS, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS, June 1996;
- *Draft Riparian Assessment Study*, Wildstone Resources, 1994;
- *Report Determining the Annual Extent of Natural and Harvest Related Blowdown in the North Coast Forest District,* J. M. Mitchell, February 1998;
- *Forest Practices Code Timber Supply Analysis*, 1996;
- *Identified Wildlife Management Strategy,* February 1999;
- *Heritage Conservation Act,* 1996.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential

impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the North Coast TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

As British Columbia progresses toward the completion of strategic land use plans, the eventual timber supply impacts associated with land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions. However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

Approximately 153 700 hectares of the North Coast TSA lies within the area currently under consideration by the Central Coast Land and Coastal Resources Management Plan (CCLCRMP) process. This process is expected to bring clarification to a number of aspects of land and resource use including decisions and designations for a number of new protected areas, as well as boundaries and resource management objectives and strategies for various zones. However, completion of the process is not expected until 2001. I am also aware that government is considering initiating a planning process for the balance of the TSA in 2001.

Forest Renewal British Columbia (FRBC) funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long-term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgment to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the North Coast TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

In particular, I note that the determination meeting for the North Coast TSA was held in March 2000 prior to the final implementation of the Nisga'a Treaty. The timber supply analysis base case therefore included assumptions regarding lands which have since been transferred out of the North Coast TSA to Nisga'a ownership. I am mindful that my authority as chief forester does not extend to any jurisdiction over these transferred lands, and I have not considered this land to contribute to the timber supply for the North Coast TSA. This rationale includes an accounting for the removal of the area and the associated timber supply from the AAC of the North Coast TSA.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in

Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (FSSIM), a series of timber supply forecasts is produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgment, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgment and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgments that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional

precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Base case for the North Coast TSA

The base case harvest forecast presented in the November 1999 timber supply analysis report for the North Coast TSA incorporated the best available information on current forest management, land base and timber yields for the TSA. It included specific assumptions about the TSA which are discussed in detail in the considerations presented later in the document. In summary, they include the following:

- the implications of management under the Forest Practices Code, including provisions for both stand- and landscape-level biodiversity has been represented (the Forest Practices Code was not fully in effect during the previous determination);
- the results of a review to assess economic and physical operability have been incorporated; and
- the results of a complete review of management for scenic values have been incorporated.

With these changes and other appropriate factors incorporated, a 'base case' was generated and submitted for public review. The base case harvest forecast projected that the then current AAC of 600 000 cubic metres could be maintained for two decades before beginning a series of declines in steps of 10 percent or less to the long-term harvest level of 361 000 cubic metres per year by decade seven.

As noted previously, the 61 000 hectares transferred to Nisga'a ownership as part of the Nisga'a Final Agreement were not excluded from the land base of the TSA in the base case of the analysis. The timber harvesting land base associated with this area is estimated to be approximately 5354 hectares, and I am mindful that it is not appropriate to consider these lands as part of the North Coast TSA land base for this decision. I will account in this determination for the implication to timber supply of the removal of these lands, and will discuss this further later in this document under *Nisga'a Lands* and 'Reasons for decision'.

In the analysis for the previous determination, the short-term harvest level in the base case could be maintained for six decades before declining to a long-term harvest level 20 percent lower than that in the 1999 analysis. The change in the harvest projections primarily result from the reinventory work which provides a better estimate of the inventory—and in which the total growing stock estimated to be available in existing stands decreased by 19 percent—as well as from the use of a more appropriate growth and yield model for managed stands.

I have considered the reasoning used to select the base case and am satisfied that it provides a suitable basis from which to evaluate the assumptions regarding land base, management practices and timber yields.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

The total land base of the North Coast TSA managed by the BCFS, as estimated from the compiled inventory data used in the timber supply analysis, was 1 868 654 hectares. A total of 758 788 hectares, or 38.8 percent of the total land base, are productive Crown forested land.

As part of the process used to define the timber harvesting land base, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest for economic, ecological or other reasons. In the North Coast TSA, the deductions resulted in a timber harvesting land base of 119 130 hectares, which is 15.7 percent of the Crown productive forest land, and 6.1 percent of the total TSA area.

I am mindful that these estimates of total land base, productive Crown forested land and timber harvesting land base made for the analysis included the area since transferred to the Nisga'a, and will account in this determination for the removal of that area.

My consideration of the deductions applied in the derivation of the timber harvesting land base is presented in the following sections of this rationale.

- economic and physical operability

Those portions of the TSA which are not physically accessible for harvesting, or which are not feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base.

1) operability mapping

Operability mapping for the North Coast TSA was originally completed in 1991, and identified all stands that were physically operable and economical to harvest given a value for the timber of at least 67 dollars per cubic metre (i.e. the mapping identified all areas which would yield sufficient value to be profitably harvested at a cost up to 67 dollars per cubic metre).

I included an instruction in my previous rationale to 'attempt to resolve the uncertainty with respect to the location and extent of the new volumes now rendered economically

operable by the recent sharp increases in fibre prices'. To address this question, district staff compared operational data to the operability mapping, and found harvesting was occurring in areas delineated as inoperable. District staff concluded that the assumption regarding the acceptable economic threshold was no longer appropriate. Values of 85 and 100 dollars per cubic metre were derived based on district and licensee input, and new operability mapping completed in 1994 used these two thresholds. Use of the 85 dollar per cubic metre value resulted in no perceptible increase to the size of the operable land base. However, use of the 100 dollar per cubic metre value led to an additional 4923 hectares or a four percent increase in the size of the timber harvesting land base. District staff reviewed operations to assess the accuracy of the new mapping and believe it to be a reasonable reflection of true operability. The mapping was finalized in 1996 and used in the 1999 timber supply analysis.

Public input expressed concern that the use of a 100 dollar per cubic metre economic operability limit led to inclusion of areas not economical to harvest. However, district staff point out that a value of 100 dollars per cubic metre is within the range noted at the timber appraisal stage of 90 to 120 dollars per cubic metre, and regional staff confirm that the value is representative of figures used in other coastal units to define an operable land base. District staff note that the size of the operable land base increased by only four percent with the use of the modified criteria, and are confident that the operability mapping used in the analysis represents the best available information for the North Coast TSA.

Input from International Forest Products Limited requested an expansion of the operable land base, using data on chart areas awarded to the licensee. The licensee referenced their current Forest Development Plan (FDP) proposals, which include plans to harvest height class 3 stands as well as lower quality western redcedar stands. However, BCFS staff have reviewed this input and believe that at the current time, there is not evidence of sufficient operational performance to warrant expanding the operable area on this basis, beyond the level already accounted for in this analysis.

Subject to my consideration of the operability in the northern portion of the TSA discussed in the next section, I am confident that the 1994 operability mapping used in the analysis represents the best available information and is suitable for use in this determination.

The size of the operable land base is difficult to define in any unit and particularly for those units in coastal B.C. I expect that the extent of the land base considered operable will continue to be refined over time. Should operational performance clearly indicate it is possible to economically harvest in areas currently excluded from the timber harvesting land base—or conversely that it is not possible to harvest in specific portions of the timber harvesting land base—this information can be factored into future analyses.

2) northern portion of the TSA

Approximately 420 000 hectares of the North Coast TSA lies north of the Nass River. At the time of the timber supply analysis, this portion of the land base contributed an estimated 18 412 hectares, or 13 percent, of the timber harvesting land base in the TSA.

District staff are concerned about the operability and merchantability of the stands of timber in this northern area. Very little harvesting has occurred north of the Nass River over the past 20 years. Many factors may be influencing the avoidance of harvesting, including climate or other growing condition constraints, high levels of decay or pathogen damage, low percentages of merchantable stand volume, poor markets, or the pattern of development in the TSA. These factors are discussed below.

The operable area in this portion of the TSA lies almost entirely within the CWH wet maritime (wm) biogeoclimatic subzone, characterized by wet, humid and mild maritime conditions with shorter growing seasons and heavier snowfalls than exist in other CWH subzones. The subzone is also subject to cold winter outflow conditions. The combination of these climatic conditions may result in slightly lower site productivity than comparable site series in other subzones, and lower species diversity in the forest stands (western redcedar and balsam are rarely present).

District staff believe from field observations that the northern stands contain volume with a higher pulp content than stands elsewhere in the TSA. Although no extensive studies have yet been conducted, staff believe that the growing conditions specific to the CWHwm subzone contribute to poorer quality wood. Although staff indicate that site productivity is sufficient for tree growth, and most stands contain trees with large stems as well as reasonable stocking levels, many of the mature trees themselves seem to have high levels of decay pathogens.

The harsher climatic conditions may contribute to poorer wood quality through physical damage to young and mature trees by snow, ice or wind, and subsequent infection by pathogens. Porcupine damage in the area may also contribute to increased incidence of decay through infection via feeding wounds. The dominance of hemlock in these stands does in itself lead to a greater overall incidence of decay compared with stands further south that are mixtures of hemlock and more decay resistant western redcedar as well as balsam and spruce.

Staff also note that some of the diseased trees appear to have accumulated substantial growth during the early development of the stand, indicating that site productivity is not the limiting factor. It is possible that harvesting these areas and managing the regenerating stands more intensively would yield a much higher return of usable volume than what is currently available on many of the sites.

The revised operability mapping did not identify any specific concerns for the northern area. The operability mapping assumed the pulp content to be consistent in stands across the TSA, and did not include a measure of the level of decay specific to the north. Assessment of product yield was not part of the criteria in the operability mapping, and the stem sizes and stocking levels in those northern stands estimated to be operable met the mapping criteria used. In the professional opinion of the consultant who conducted the mapping, those stands which are economical to harvest based on the criteria used were identified.

As noted previously, there has been very little operational performance in the northern part of the TSA. Special provisions for log exports which were temporarily in place approximately ten years ago resulted in some very limited harvesting at that time. Staff

note that—given the suspected high pulp content in these stands—improved pulp markets should lead to some harvesting in the northern area. However, an increase in pulp prices in 1994 which culminated in 1995 did not lead to any increased interest in harvesting in the north. The lack of activity even during good markets raises uncertainty about the economics of harvesting in these stands.

No specific sensitivity analyses were conducted to evaluate the impact of reducing the timber harvesting land base by the amount which lies in the northern portion of the TSA. However, standard sensitivity analysis which assessed the impact of decreasing the timber harvesting land base by ten percent showed the base case initial harvest level could be maintained for one decade before beginning a series of declines similar to those in the base case. In decade six, a long-term harvest level is reached which at 325 000 cubic metres per year is ten percent lower than that of the base case.

Review of the information indicates to me that the issues surrounding harvesting performance north of the Nass River are complex and require additional research and data to clarify. However, I am concerned about the lack of performance in an area which contributes 13 percent of the timber harvesting land base of the TSA. It is possible that the lack of operational performance in the area is simply a function of the pattern of development in the TSA. However, the area north of the Nass River has been charted and is available for harvest by both major licensees and the SBFEP. Continued avoidance of the area, in particular given the conflicts around watersheds in the southern portions of the TSA, will place increasing pressures on other portions of the land base.

I am mindful that the operability mapping criteria did not incorporate an assessment of the product yield and hence value of the wood available. Incorporation of an assessment of product yield is difficult without extensive operational cruising or specialized sampling. Nevertheless, if the area north of the Nass River contains stands which are of marginal economic value or uneconomical to harvest, then this area should be excluded from contributing to the timber harvesting land base in future analyses. Sensitivity analysis results show that timber supply after the first decade is sensitive to uncertainties in the size of the timber harvesting land base. This highlights the need to ascertain whether the northern areas should contribute to timber supply at the level at which it is currently assumed.

From review of the information, I believe that there is sufficient uncertainty to consider the appropriateness of a partition to this area. I will discuss this further under *partitions* and in my 'Reasons for decision'.

In addition, I am mindful that the extent of area north of the Nass River which was assumed in the timber supply analysis has changed somewhat since the analysis was undertaken as a result of the Nisga'a Final Agreement (NFA). District staff estimate that of the 5354 hectares of timber harvesting land base in the NFA area, 4537 hectares lie north of the Nass River. As a result, the total timber harvesting land base in the north is now 13 875 hectares, or 12.2 percent of the total of timber harvesting land base in the North Coast TSA.

- sites with low timber growing potential

In order to delineate the timber harvesting land base, sites with low productivity as a result of inherent site factors such as nutrient availability, exposure, excessive moisture, or that are not fully occupied by commercial tree species are excluded from the productive forest land base. Low productivity sites in the North Coast TSA tend to be wet, boggy sites where the growth of existing natural stands has been limited by moisture and climate. Approximately 49 percent of the productive forest land base in the TSA is occupied by mature stands less than 25.4 metres in height (height class 2 and 3).

In the timber supply analysis, low productivity sites were identified using inventory file data according to criteria of age, height and site index. All stands with site indices less than 10 metres were excluded from contributing to timber supply. In addition, all stands which were 80 years of age or more, but which had not achieved a height greater than 19.4 metres (height class 2) were excluded. In total, 371 572 hectares were identified as having low productivity, which resulted in an exclusion of 276 449 hectares following other reductions.

At the time of the previous determination, I included an instruction to district staff to 'attempt to resolve the uncertainty with respect to the location and extent of the volume potentially accessible in low sites, height class 2 stands, and cypress-leading stands, and the operational requirements necessary to harvest and reforest those areas'. In response to this instruction, district staff initiated a five-year research project in which low productivity sites are being examined to evaluate if the harvest of the existing stand and subsequent site preparation could improve the long-term productivity of some sites. The project is not yet complete but results are expected to be available for the next timber supply analysis. Research results thus far indicate that within the management regime applied, the yields possible from regenerated managed stands on these sites could be greater than those of the existing stands. However, district staff note that the results are too preliminary to provide data on which to base changes in the criteria applied for low sites at this time.

International Forest Products Ltd. expressed the opinion that while height class 2 stands were clearly not operable, height class 3 stands should contribute to timber supply. They suggested consideration of a partition to these stands over and above the current harvest level to allow for demonstration of performance. District staff note that there were some height class 3 stands exceeding the minimum criteria applied in the analysis for operability and low productivity which were included in the timber harvesting land base. Staff believe that this level of contribution reflects current practice, as there is currently limited performance in height class 3 stands from the licensees operating in the TSA.

I am aware of the input provided by International Forest Products Ltd. which indicates both current performance, and a willingness to continue to harvest in lower quality stands. If they believe it to be appropriate, I encourage them to provide data for the next timber supply review which could be used to further refine the assumptions about low productivity sites.

If and when research results indicate the potential to manage some of the excluded stands for timber production from a biological, silvicultural regime and economic viewpoint—and when this is accompanied by data indicating demonstrated performance in these areas—then it may be appropriate to consider some level of contribution from these stands in a future timber supply review. I note that the area excluded to account for low productivity sites is large enough to be significant in terms of timber supply. If it were possible and appropriate to manage some of these areas for timber production then timber supply could potentially be more stable than projected in the base case.

For this determination, I have considered the information regarding sites with low timber growing potential and I am satisfied that the exclusions applied in the analysis were appropriate.

- environmentally sensitive areas

An environmentally sensitive area (ESA) is an area identified during a forest inventory that is sensitive to disturbance and/or is significantly valuable for fisheries, wildlife, water and recreation resources. ESA information is used to identify land to exclude from the timber harvesting land base where more specific or detailed information is not available about a particular forest resource. The ESA mapping for the North Coast TSA was completed during the original forest inventory in 1970.

ESA ratings are classified as E1 (highly sensitive) or E2 (moderately sensitive). In the definition of the timber harvesting land base, a specific percentage of each classified area is deducted from the productive forest to reflect the proportion of area unavailable or inappropriate to harvest in operational practice. In the timber supply analysis, exclusions were applied to account for soil sensitivity, regeneration difficulties, water quality, and avalanche hazard.

Those areas identified as moderately or highly sensitive for water quality and avalanche hazard were 100 percent excluded. No reductions were applied in the analysis for areas identified in the ESA mapping as sensitive for wildlife (Ew), and this will be discussed under *wildlife habitat*. Reductions applied to account for regeneration difficulties will be discussed under *impediments to prompt regeneration.*

To account for soil sensitivity, 100 percent of the 151 771 hectares identified as highly sensitive for soils (Es1) were excluded. In addition, 25 percent of the 9908 hectares identified as moderately sensitive for soils (Es2) were excluded.

District staff note that terrain stability mapping has been completed for portions of the North Coast TSA, although it is not sufficiently comprehensive to be used in the timber supply review. Staff have reviewed the results of the mapping completed to date, and have found a poor correlation to the Es data. A comparison of areas designated as terrain class 4 and 5 under the terrain stability mapping to areas designated as Es1 and Es2 showed very little overlap. However, there is not enough information at this time to determine whether use of the ESA mapping data leads to an under- or overestimation of areas with sensitive soils. Staff state that they intend to review the classification for areas where slides have occurred to further evaluate the level of predictability provided by the Es data.

Input from International Forest Products Ltd. suggested the reduction factor for Es1 should be lower than 100 percent. They note that a typical reduction applied to account for Es1 areas in other coastal management units is 90 percent, and in their opinion the reduction should be even less. Their premise is based in part on the increasing use of helicopter harvesting in the TSA, which results in lower levels of soil disturbance and consequently fewer terrain stability concerns. Additional public input expressed the opinion that the analysis overstates the land base by including 75 percent of the area classified as Es2, and recommended that district staff complete terrain stability mapping over the entire timber harvesting land base to provide adequate information for resource protection.

I am aware of the expense associated with terrain stability mapping. However, district staff indicate sufficient funding may be available to obtain data for the rest of the TSA prior to the next determination. Given the climate and topography of the TSA, it is reasonable to expect that a large proportion of the land base would be unavailable for timber harvesting due to terrain instability. I note that over 151 000 hectares were identified by the ESA data as having high soil sensitivity. District staff believe that the magnitude of area with this classification, in comparison to the size of the timber harvesting land base, seems appropriate given their general knowledge of soil instability in the TSA. At the operational level, areas with soil instability are managed appropriately using the data from detailed terrain stability assessments, and I am confident that there is no undue risk posed to the resources from possible inaccuracies in the ESA data. I am satisfied that the timber supply analysis used the best currently available information for soil sensitivity and that there has been adequate accounting for this factor.

In my view, the North Coast TSA is one of the most difficult areas of the province for which to define a physically and economically accessible land base. Subject to the availability of funding, I encourage staff to continue to collect terrain stability information and compare results to existing ESA data, in order to better quantify the amount of area with unstable soils. Any refinements in soil sensitivity data can be used in future determinations.

- problem forest types

Problem forest types are typically defined as stands which are physically operable and exceed low site criteria and yet are not currently utilized or have marginal merchantability. A total of 62 770 hectares or nine percent of the Crown productive forest were excluded from the analysis land base to account for problem forest types.

1) deciduous species

In the North Coast TSA, approximately two percent of the productive forest land base is occupied by deciduous forest types. Limited data is available on the quality and merchantability of the wood volume in these stands.

In the timber supply analysis, all deciduous species except for cottonwood were excluded from the timber harvesting land base. Cottonwood-leading stands as well as the cottonwood volume in coniferous-leading stands were assumed to contribute to timber

supply. There are 400 hectares of cottonwood-leading stands on the timber harvesting land base. In operational practice, some limited harvesting of this species—usually in conjunction with coniferous volume from an adjacent stand—occurs and the volume is charged to the AAC. District staff are satisfied that the assumptions in the analysis regarding cottonwood harvest appropriately reflect current practice.

The volume from other broad-leaved species is not currently utilized in the North Coast TSA. Red alder-leading stands and the volume contribution from red alder in coniferous-leading stands were entirely excluded from contributing to timber supply in the analysis. District staff confirm that red alder is not currently part of the harvest profile in the TSA.

Public input requested that red alder be considered to contribute to timber supply, affirming that there is market demand for the species. A letter recently submitted to the district manager has requested consideration of red alder as a commercial species. I am aware of the current interest in the utilization of red alder on the coast, and note that the BCFS recently commissioned a research review which collated all information pertinent to an assessment of the extent, distribution and viability as a commercial and merchantable species. The review identified where more information is needed to assess potential contribution to timber supply of this species, but did not specifically address the value of the resource in any particular area, such as for the North Coast TSA.

Data from the inventory file indicate that 2100 hectares could potentially be added to the timber harvesting land base if red alder stands were not excluded. However, there is some uncertainty about whether this is the full extent of the area occupied by red alder in the North Coast TSA. District staff note that forest cover data from the inventory file tends to focus on merchantable coniferous species, and provides little detail on other species. Staff also believe that many red alder stands were excluded during the application of the operability criteria.

Little is known about the typical characteristics of the red alder stems available in the North Coast TSA, or whether their characteristics point to economic merchantability for the species. In addition, limited data is available on the appropriate decay, waste, and breakage factors to apply in red alder stands. Intensive management may be required to develop high quality red alder stems with associated high costs. The research review highlighted the importance of local data on the existing age class distributions for the species as one factor to determine merchantability and harvesting opportunities. This information combined with other localized data would indicate whether utilization of the resource is best limited to a one time opportunity, or whether stand management strategies should include managing some sites exclusively for red alder production.

Concern was also expressed about the impact on coniferous harvest levels if volume contribution is assumed from red alder stands. Currently, deciduous volumes harvested in the North Coast TSA are not administered separately but contribute to the overall AAC, and as such any deciduous volume harvested correspondingly reduces the volume allowed to be billed from coniferous species. To date, deciduous volume contribution has been low enough to not contribute significantly to the AAC. However, if red alder stands are considered to contribute to timber supply, some licensees believe that the volume

contribution should be in addition to the existing AAC, rather than be included in the current harvest level, thereby reducing the allowable cut from coniferous stands.

I am also aware of the policy issues around setting specific management objectives for regeneration on sites currently occupied by red alder, as current policies generally lead to conversion of the species in these stands to acceptable coniferous species. These policies would require review if it is decided that long-term goals include management of some of these sites for production of red alder.

I note that there are clearly many uncertainties associated with the viability of red alder as a merchantable species in the North Coast TSA. I have reviewed the available information, and conclude that resolution of some of the uncertainty, through ongoing data collection and analysis would do much to clarify the issues. I believe clarification is needed before contributions to timber supply can be contemplated. In particular, for the sites currently occupied by red alder, it would be useful to obtain an assessment of whether the species is projected to be appropriate to manage for on the sites, with consideration of other resource values such as biodiversity and wildlife habitat as well as economic and social values.

I am satisfied for this determination that it was appropriate to exclude all red alder volume given the lack of historic utilization and demand. I note that this does not pass any judgment on the viability of proposals to utilize red alder in the North Coast TSA, and encourage proponents to continue to work with BCFS staff and others to resolve the uncertainties discussed regarding the extent, distribution and viability of this species. Over the term for which this determination is in effect, I am willing to revisit this decision sooner than the five years required by legislation if sufficient information is presented to me by those parties interested in the harvest of red alder that an additional volume should be considered from these areas, in the context of any policy considerations as described above.

With respect to the cottonwood stands, I am satisfied that the 400 hectares were appropriate to include on the timber harvesting land base, given that there is some volume contribution from these stands in current practice.

2) unmerchantable stands

In addition to the exclusions for deciduous species as discussed above, criteria were used in the analysis to exclude unmerchantable coniferous stands. Unmerchantable coniferous stands were defined by district staff as those stands in which crown closure is less than 36 percent and age is greater than 60 years. In addition, all pine- and larch-leading stands were excluded from contributing to timber supply.

District staff are satisfied that the criteria used to identify and remove unmerchantable stands were appropriate and reflective of current practice, as these forest types are not currently utilized in the North Coast TSA. I accept that there was appropriate accounting for unmerchantable stands in the analysis.

- TSA boundary changes

In 1999, the district managers for the North Coast and Kalum Forest Districts signed an agreement to formalize the exchange of lands from the Kalum TSA to the North Coast TSA, and from the North Coast TSA to the Nass TSA. The order-in-council for the TSA boundary changes was officially designated on January 27, 2000, and signed by the Minister of Forests on June 6, 2000.

As a result of the changes, approximately 91 938 hectares from the North Coast TSA has been transferred to the Nass TSA, and 6077 hectares from the Kalum TSA has been transferred to the North Coast TSA. BCFS staff state that the net impact to the timber harvesting land base for the North Coast TSA is a reduction of 1667 hectares. This reduction represents 1.4 percent of the timber harvesting land base assumed in the analysis, or 1.47 percent of the timber harvesting land base following the transfer of lands to the Nisga'a, which is discussed in the following section.

The boundary changes formalize operational practices which have been in existence for some time. The area removed from the North Coast TSA has been managed by the Kalum Forest District as part of the Nass TSA for several years from the field office located in Stewart. Similarly, the area added to the TSA has been managed by the North Coast Forest District for some time.

I will therefore take into account in this determination the impact to timber supply of the transfer of these areas. I will discuss this further under my 'Reasons for decision'.

- Nisga'a Lands

A portion of the North Coast TSA is identified in the Nisga'a Final Agreement (NFA). The NFA became effective on May 11, 2000 resulting in these lands being transferred to the Nisga'a in fee simple as 'Nisga'a Lands'. The NFA includes provisions on forest resources, wildlife, fisheries and access as well as environmental assessment and protection on 'Nisga'a Lands'. The Nisga'a Nation own all forest resources on Nisga'a Lands, an area which includes lands within the North Coast TSA as well as the Kalum and Nass TSAs and TFL 1. As a result of the implementation of the NFA, approximately 61 000 hectares were transferred from the North Coast TSA gross land base, with an estimated associated timber harvesting land base of 5354 hectares.

In May 2000 under the authority of Part 14 of the *Forest Act*, I issued written orders to reduce the AAC for the North Coast TSA to account for the impacts of the transfer in ownership of land and forest resources to the Nisga'a Nation which resulted from the NFA. These written orders included a reduction of 25 600 cubic metres in the AAC for the TSA to reflect the smaller land base. In this determination for the North Coast TSA, I will account for the permanent withdrawal of the area from the TSA and the contribution of the lands to the AAC.

At the time that the 1999 timber supply analysis for the North Coast TSA was initiated, the NFA was not yet complete. A sensitivity analysis was prepared as part of the analysis to assess potential impacts to timber supply, using assumptions about the area described by the Agreement in Principle (AIP) which preceded the NFA. In the sensitivity analysis,

the then current AAC of 600 000 cubic metres could be maintained as an initial harvest level for one decade, after which it began a series of declines similar to the base case to a long-term harvest level of 338 000 cubic metres per year in decade six. In this scenario, the long-term harvest level was 6.4 percent lower than that projected in the base case.

The NFA has now been implemented and approximately 61 000 hectares have been removed from the North Coast TSA. I am aware that the total area removed is approximately 258 hectares larger than assumed in the sensitivity analysis. The exact size of the timber harvesting land base associated with this land base is unknown, but given the small variation in gross area from that delineated in the AIP, I expect that it is very close to that assumed in the sensitivity analysis. I am therefore satisfied that the assumptions applied in the sensitivity analysis described above are a reasonable approximation of the impact of removal of these lands from the TSA.

The results of the sensitivity analysis were considered in the preparation of estimates of AAC reductions which I applied in my May 2000 written orders to the units affected by the NFA. The sensitivity analysis provides one possible harvest flow scenario for the area that the North Coast TSA now encompasses, and I note that the appropriate harvest level is a function of many variables including the existing composition and structure of the forest, current and future management objectives, harvest flow alternatives, and socio-economic considerations.

For this determination, although the sensitivity analysis results indicated that the then current harvest level of 600 000 cubic metres could be maintained for one decade before declining, I believe it would be neither responsible nor appropriate to maintain this level of harvest in the TSA. The lands transferred to Nisga'a ownership have been permanently removed from the TSA and do not contribute to the land base for this decision. I am also mindful that the land removed from the TSA is subject to a level of harvest as specified in the NFA such that, if I do not take into account a permanent and immediate reduction to the harvest level for the North Coast TSA which corresponds to the expected impact of the land transfer, the net result would be an increased level of harvesting activity in the region.

In the estimation of an appropriate reduction to apply in my May 2000 written orders, I considered information presented to me, including an assessment of the harvest level impacts across the management units affected by the NFA, and the commitments made in the NFA regarding available harvests from the Nisga'a Lands. The reduction in the AAC for the North Coast TSA of 25 600 cubic metres considers the impact to the long-term harvest level of the North Coast TSA, relative to the total impact to the long-term harvest level of all of the affected management units, and the NFA commitment to a total annual harvest from Nisga'a Lands of 165 000 cubic metres per year for the first five years.

In the absence of any more detailed information at this time, and mindful that some contribution is expected from Nisga'a Lands to timber supply in the region over the next few years, I will account for the reduction of 25 600 cubic metres per year from the harvest level of the TSA in this determination. I will discuss this further in 'Reasons for decision'.

- roads, trails and landings

In the timber supply analysis, a percentage of the productive forest considered available for harvesting was removed to account for the loss of productive land as a result of the construction of roads, trails and landings. Separate estimates are made for existing roads, trails and landings, and future roads, trails and landings, to reflect both potential changes in road building practices and road network requirements over time, and the access that the existing network of roads will provide for future harvesting operations. Estimates account for the area that is permanently removed from the timber harvesting land base and are applied as percentages of area to be excluded from specified age classes.

For the analysis, it was estimated that there were 935 kilometres of existing roads, trails and landings in the North Coast TSA. To account for the resulting permanent loss of productivity, a total of 1976 hectares were excluded from stands less than 41 years of age.

District staff have reviewed the exclusions applied in the analysis, and indicate that due to some inaccuracies in the stand age data in the inventory file, the analysis overestimates the permanent site productivity loss resulting from existing roads, trails and landings by 546 hectares.

For future roads, trails and landings, a reduction factor of 8.4 percent was applied to stands as they were harvested in the modelling to account for permanent site loss. This resulted in an exclusion of 7797 hectares over the entire analysis horizon.

Public input from International Forest Products Ltd. expressed the opinion that the reduction applied for future roads, trails and landings in the analysis was excessive. They point to values applied in other TSAs of between five and seven percent, and on their coastal TFLs of between four and five percent. They believe that operating conditions in these other units are similar to those in the North Coast TSA. The licensee also references a 1993 study by BCFS Research Branch indicating permanent site productivity loss is generally half of site degradation due to canopy closure. District staff have reviewed the cited report and believe that the assumptions applied in the report—most specifically, that the soil at the road edge is productive for tree growth—do not necessarily apply to the North Coast TSA. They further note that data collection regarding edge effect in the TSA is ongoing and better information may be available for the next determination.

District staff believe the reductions applied for future construction are appropriate given the terrain and operating conditions in the North Coast TSA. They state that data collected since my 1995 AAC determination indicate road construction is occurring on increasingly steep and difficult terrain, resulting in fairly high levels of permanent productive site loss.

I have reviewed the information regarding reductions for roads, trails and landings. I am satisfied that an adjustment of 546 hectares to account for the overestimation of site loss from existing roads, trails and landings is appropriate and will discuss this further in my 'Reasons for decision'. With respect to future roads trails, and landings, I am satisfied that the reductions applied in the analysis were appropriate and have made no further adjustments in this regard.

I encourage International Forest Products Ltd. and other licensees to work with BCFS staff to collect localized data on permanent loss of site productivity resulting from the construction of roads, trails and landings, such that estimates can be refined for future determinations.

- timber licence reversions

Timber Licences (TLs) are old tenure arrangements that give a licensee exclusive rights to harvest merchantable timber within the licence area. Once these areas have been harvested and reach a free growing condition, all future harvesting rights revert to the Crown, and future harvests from the area contribute to the harvest for that TSA which contains the TL area.

There are 843 hectares held in three TLs in the North Coast TSA. One of the TL areas, comprising approximately 325 hectares has already been harvested and will revert to the Crown once free growing has been achieved. For the timber supply analysis, this area was included in the timber harvesting land base.

A second TL comprising 259 hectares was classified incorrectly in the inventory file as inoperable and was therefore excluded from the timber harvesting land base for the purposes of the analysis. This exclusion is appropriate in the short-term given the area has not yet reverted to the TSA land base. However, in the long-term the result is a very small underestimation in the size of the timber harvesting land base.

The third TL area, also 259 hectares in size, was not classified in the inventory file as a TL and thus was included in the timber harvesting land base in the analysis. This results in a small overestimation in the size of the timber harvesting land base in the short-term, until the area is truly available to contribute to the timber supply for the TSA. However, 130 hectares of this TL has already been logged, and the forest cover information accurately reflected this in the inventory file, so the end result is a 129 hectare overestimation in the size of the timber harvesting land base in the very short-term only.

I have reviewed the information presented regarding TLs and am prepared to account for a slight underestimation in long-term timber supply resulting from the 259 hectares excluded in the analysis, and a very slight overestimation of short-term timber supply resulting from the 129 hectares included in the analysis. I will discuss this further in my 'Reasons for decision'.

- woodlot licences

The *Forest Act* requires AACs determined for TSAs to be exclusive of the areas and timber volumes allocated to woodlot licences. When a woodlot licence is initially issued, the required volume is first allocated from an appropriate apportionment under the AAC for the TSA that geographically contains the woodlot. Then, in the next AAC determination for the TSA, the total land base is reduced by the area of Crown land held in woodlot licences—including those issued since the previous determination—and the volume associated with the recently issued woodlot licences is excluded from contributing to the AAC for the TSA.

No adjustments were made in the analysis for the North Coast TSA to account for woodlots, as at the time of the analysis no woodlots had been issued.

One woodlot licence comprising 400 hectares of Crown productive forest land was awarded in March 1998. This woodlot licence was issued in March 2000 with an AAC of 776 cubic metres per year.

For this determination, I will take into account a 776 cubic metres per year overestimation of timber supply, as well as exclusion of 400 hectares from the land base over the entire analysis horizon, and will discuss this further in my 'Reasons for decision'.

- protected areas

Government released the document *A Protected Areas Strategy for British Columbia* in 1993, which describes the policies and process to protect 12 percent of the province. The strategy has two goals: representativeness (Goal 1) which protects viable examples of the natural diversity of the province; and, special features (Goal 2) which protect the special natural, cultural heritage and recreational features of the province.

British Columbia contains large areas of undeveloped coastal temperate rainforests. Temperate rainforests are complex and highly productive ecosystems with high masses of living and dead material and which support large, old trees as well as an exceptional diversity of plant and animal species. Under the Protected Areas Strategy (PAS), many new parks and protected areas have been designated, including the Khutzeymateen Protected Area in the North Coast TSA. The PAS areas, in combination with previously protected areas, bring the total of coastal temperate rainforest which lies in protected areas to nine percent in British Columbia.

In total, 53 240 gross hectares of existing parks and ecological reserves in the North Coast TSA were entirely excluded in the timber supply analysis.

Also under the strategy, a number of 'study' areas under both Goal 1 and Goal 2 criteria were designated by Cabinet in 1993 for each ecoregion of the province. These study areas, which have been deferred from harvesting or any other resource activities since 1993, will be discussed later in this rationale under *study areas.*

With respect to the existing parks and protected areas, I am satisfied that the analysis appropriately excluded these areas from contributing to timber supply and make no further adjustment on account of this factor.

Existing forest inventory

The land base for the North Coast TSA was inventoried in 1970, and this inventory data was used in the analysis for the 1995 determination. A reinventory was initiated in 1994 and was partially completed when the data was compiled for the 1999 timber supply analysis. The new inventory data that was available was compiled with the older data to form the file for the 1999 analysis.

The 1999 *Analysis Report* indicated that 69 percent of the timber harvesting land base was derived based on old inventory data. This statement was incorrect; in reality,

approximately 69 percent of the timber harvesting land base lies on the reinventoried mapsheets, with the remainder based on the old inventory. All mapsheets were projected to 1997 for growth. Updates for disturbances such as harvesting and fire, and for silvicultural treatments were made to 1990 for the old inventory mapsheets, and to 1995 for the new inventory mapsheets. District staff do not anticipate any significant impacts to timber supply resulting from forest cover changes since that time.

As is the case with most management units in the province, an inventory audit was conducted in the North Coast TSA by BCFS staff to address uncertainties in the inventory data. The audit was compiled for the old inventory data as well as for the new inventory data. The audit reviewed:

- the mature component of the inventory, assessing differences between the existing inventory's estimate of mean mature volume per hectare for the TSA and a new estimate obtained from the audit samples; and
- the immature component, testing site index assignment.

I have discussed the results of the audit under *volume estimates for existing stands* and *volume estimates for regenerated stands.*

I have considered the information regarding current forest inventory and am satisfied, subject to any discussion under the following factors, that the compiled inventory file used in the timber supply analysis forms a good basis on which to make my determination.

- age-class structure

Age class structure data is extracted from the inventory file and used in the analysis to project forest stand conditions over time. Assumptions about age classes can impact timber supply at any point in the analysis horizon since they form the basis against which minimum harvestable ages, green-up requirements and other forest cover constraints are applied, and yield is estimated.

For those landscapes units containing timber harvesting land base, approximately 81 percent of the area outside the timber harvesting land base and 74 percent of the area within the timber harvesting land base is currently covered with stands older than 250 years of age. The distribution in the various age classes represents a predominantly old growth forest with relatively little logging and disturbance history.

District staff are satisfied that the age class distribution presented in the timber supply analysis is accurate. I have reviewed the information and am satisfied that the age class structure was appropriately reflected in the timber supply analysis.

- species profile

The major tree species in the North Coast TSA are western hemlock, western redcedar, balsam, sitka spruce and yellow cedar. Minor species include shore pine (the coastal variant of lodgepole pine), red alder and black cottonwood.

The timber harvesting land base in the North Coast TSA—as described by the data in the compiled inventory file—is dominated by western redcedar-, hemlock- and balsam-leading stands. Approximately 53 percent of the timber harvesting land base is occupied by hemlock/balsam stands, 40 percent is occupied by western redcedar and hemlock/cedar stands (which includes cedar-leading and hemlock-leading with a cedar component), and 7 percent is occupied by spruce-leading stands.

A concern expressed at the previous determination for the North Coast TSA related to suspected inaccuracies in the species labels in the inventory file. District staff are satisfied that the new inventory data contains better species estimates than the old inventory. The new inventory data was used for 69 percent of the timber harvesting land base in the timber supply analysis.

The species distribution presented in the timber supply analysis is reflective of current stand conditions in the TSA. I am satisfied that this information was reflected appropriately in the timber supply analysis.

- aggregation

In timber supply analysis, stands on the timber harvesting land base are grouped into several analysis units based on specific characteristics defined by the district staff and the analyst, such as management strategy, species, site indices, etc. For the base case for the North Coast TSA, stands were grouped into 30 analysis units following standard procedures.

Upon consideration of the information presented, I am satisfied with the approach taken in the analysis and do not believe that there is any risk posed to timber supply as a result of the aggregation used in the analysis.

- volume estimates for existing stands

Two growth and yield models were used to estimate timber volumes for the North Coast TSA analysis. The Table Interpolation Program for Stand Yields (TIPSY), developed by the BCFS Research Branch was used to estimate yields for all managed stands, which will be discussed later in this rationale.

Existing natural stand volumes were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model (version 6.5), which was developed by the BCFS Resources Inventory Branch. The volumes for all older existing natural stands in which species and stocking have not been managed were projected using this model. Once a stand was harvested for the first time in the analysis, future growth and yield was projected using estimates from managed stand yield tables. The exception to this was for the cottonwood-leading stands, where future volumes were also projected using VDYP.

At the time of the previous determination, both licensee and district staff were concerned that the existing stand volumes were overestimated by the inventory, possibly by as much as 19 percent. At that time, a comparison of cruise and inventory volumes from 1992 and 1993 showed possible overestimations of approximately 20 percent. In the rationale for

the 1995 determination, I instructed staff to 'attempt to resolve uncertainty with respect to the degree to which existing mature volumes may be overestimated by growth and yield model used in the timber supply analysis.'

As discussed under 'Existing forest inventory', the North Coast TSA has been reinventoried since the last timber supply analysis, and the new data was used for 69 percent of the timber harvesting land base in the 1999 analysis. District staff believe that the majority of concerns about overestimations in existing stand volumes have been eliminated by the new inventory data.

A comparison of data from the two analyses shows that there is 17 percent less total growing stock at the start of the analysis horizon for the 1999 analysis. The audit conducted in 1996 on the forest inventory was compiled for both the new and old inventory data. The audit results compared with the old inventory on the operable land base indicated inventory volumes were overestimated by six percent, but the sample size was small and the difference was not statistically significant. The audit results compared with the new inventory showed a smaller difference between the audit and inventory estimates. A third compilation of the audit results was prepared for comparison with the inventory file used in the timber supply analysis (which consisted of both old and new inventory data). This audit found the mature operable inventory volumes were two percent higher than those of the audit sample. However, the audit sample size is too small to base any specific conclusions on the results.

Given that existing unmanaged stands comprise 88 percent of the timber harvesting land base at the start of the analysis horizon, short-term timber supply is dependent on their volume contribution and any uncertainty regarding this contribution has the potential to affect harvest levels. District staff note that they have a high degree of confidence in the newer inventory data, citing a field comparison between the inventory data, cruise data and harvested cutblock volume data which showed less than 3 percent variation in volumes. Consideration of this information indicates that for approximately 69 percent of the stands on the timber harvesting land base, there is a higher degree of certainty about the volume estimates than for the remaining 31 percent of the stands for which the old inventory data was used. There is some evidence to suggest that the stand volumes for 31 percent of the timber harvesting land base may be overestimated in the analysis.

Public comment received from the Hartley Bay Band Council expressed concern about uncertainty in the volume estimates for existing stands. They note the sensitivity of timber supply to possible overestimations in existing stand volumes, and also point to the audit results which indicate existing stand volumes from the old inventory were overestimated. The band council believes that the potential sensitivity of timber supply to uncertainties in this factor warrants conducting a power analysis or similar process to assess reliability of audit results. Timber Supply Branch staff have reviewed both the public input and the audit results, and indicate that the number of audit samples required to reliably conclude there is no consequential difference between the audit and inventory data, is far in excess of what is currently fiscally feasible.

Sensitivity analysis which evaluated the impact to timber supply of over- or under-estimations in existing stand yields showed that short- and mid-term timber supply is very

sensitive to uncertainties in existing stand yield estimates. A ten percent reduction in existing stand volumes led to an immediate 30 percent decrease in the initial harvest level to 419 000 cubic metres per year, followed by ten percent and four percent reductions in the second and third decades. Additional sensitivity analyses prepared by timber supply branch staff suggests a threshold of approximately two percent overestimation of existing stand yields before the initial harvest level requires alteration.

I have considered the information on existing stand yield estimates, and believe that there is still some uncertainty about the yields projected in the analysis. It is possible that yield estimates were overestimated for approximately one-third of the land base assumed to contribute to timber supply in the analysis. This overestimation is currently unquantified but may be as great as 20 percent on the one-third of the land base in question. I will take into account the risk to timber supply as a result of this factor and will discuss this further under 'Reasons for decision'.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e. less than 31 years old), and existing older stands (i.e. over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—known as the old-growth site index (OGSI) project—suggest that actual site indices may be higher than those indicated by existing data from old growth forests. In recent years it has been concluded from such studies that site productivity has generally been underestimated; managed forest stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

Current practice in timber supply analysis for TSAs in B.C. is to incorporate adjusted site productivity results in a base case analysis where they have been obtained from a localized study within the TSA; where no such results are available, generalized OGSI adjustments are applied in a sensitivity analysis. As there were no paired plot or veteran studies conducted under the OGSI project that were localized to the North Coast TSA, no adjustments were applied in the base case to account for any possible underestimations in site productivity. Several sensitivity analyses were conducted to evaluate the potential

impact to timber supply. In the first, in which site index was adjusted by the amount predicted in the paired plot studies only, the initial harvest level could be maintained at an almost nondeclining even flow level (only experiencing a small reduction in decade 11 for four decades). Adjustment of the site index by the amounts suggested in the veteran studies showed the initial harvest level could be maintained for 100 years before increasing to a long-term harvest level in decade ten of 826 000 cubic metres per year. These results, although not definitively applicable to the North Coast TSA, show that timber supply is highly sensitive to managed stand productivity estimates and can be favourably increased if site productivity is indeed underestimated.

Public input from International Forest Products Limited expressed the opinion that the site productivity adjustments indicated by the OGSI studies should be applied in the base case, as was done in the recent timber supply analysis for the Kalum TSA. However, I note that the OGSI adjustments were applied in the base case for the Kalum analysis because data for the studies was collected within the TSA. Although the Kalum TSA borders the North Coast TSA, there is uncertainty about the extent to which that OGSI data can be applied to stands in the North Coast TSA given the obvious ecological differences between the two units. I am satisfied that it was appropriate to measure the timber supply impact of the OGSI adjustments using sensitivity analyses, rather than including the adjustments in the base case for the North Coast TSA.

In general, licensees operating in the North Coast TSA have expressed concern about the underestimation of site indices when existing stand measurements—such as those from the inventory file—are used to project future stand growth. Licensee staff have observed during regeneration and free to grow surveys that regenerated stand productivity is greater than described by the original stand. In their experience, estimates of site productivity using growth intercept methods are far higher than represented by the existing stand data on the inventory file, indicating that site productivity is understated for the stands in the North Coast TSA.

District staff concur with the concerns expressed by licensees regarding underestimations of site productivity. Some preliminary studies conducted by Prince Rupert Forest Region staff show that site index estimates derived using the Site Index Biogeoclimatic Classification (SIBEC) method—which involves the use of site-specific field data and biogeoclimatic information to predict site indices for various species—are greater than those in the inventory data. However, more work is needed on a larger scale and involving all BEC zones and species within the TSA. BCFS staff hope to obtain funding to conduct these studies which will provide more specific information for the next timber supply analysis.

Analysis showed that site productivity estimates significantly impact the minimum harvestable ages derived in the timber supply analysis for North Coast stands, as discussed later in this rationale under *minimum harvestable ages*.

I have reviewed the information and note that localized data for the North Coast TSA is needed to provide an assessment of the site productivity adjustments which would be applicable in this unit. A lack of any definitive data makes it difficult to estimate the amount by which site productivity may be underestimated. I am confident that data will

indicate site productivity is indeed underestimated by some amount in the North Coast TSA, and request that district staff obtain funding to obtain local data prior to the next determination.

The results of sensitivity analysis indicate that timber supply may be significantly more stable than shown by the base case if site productivity is underestimated by the amount found in the OGSI studies. However, OGSI adjustments assume a specific management regime for second growth stands in order to achieve the full site productivity benefit. Therefore, in addition to obtaining local information, it is important to clarify the expected regime for managed stands in the North Coast TSA.

For the purposes of this determination, I am mindful of the possibility that timber supply may be more stable than shown in the base case as a result of the underestimations in site productivity, and will discuss my considerations of this further under 'Reasons for decision'.

- volume estimates for managed stands

To estimate stand volumes for coniferous managed stands, the BCFS uses the Table Interpolation Program for Stand Yields (TIPSY), developed by the BCFS Research Branch. Managed stands for the North Coast TSA were defined in the analysis following input from district staff as all existing stands under 21 years of age, and all stands regenerated following harvest in the future.

TIPSY projections are initially based on ideal conditions, assuming full site occupancy and the absence of pests, diseases and significant brush competition in the stand. Operational adjustment factors (OAFs) are applied to account for losses of timber volume due to stand openings for unproductive areas like small swamps and rock outcrops (OAF1), as well as for age-dependent factors such as pests, disease, decay, waste and breakage (OAF2). In the BCFS analysis, the provincial standard reductions of 15 percent for OAF1 and 5 percent for OAF2 were applied.

At the time of the previous timber supply analysis TIPSY was not yet available for use, and managed stand yield estimates were produced using VDYP. Uncertainty around the managed stand yield estimates arising from the use of VDYP was recognized at the time of the previous determination, and I included an instruction to 'attempt to resolve the uncertainty with respect to the degree to which regenerated volumes may be underestimated by the growth and yield model used in the timber supply analysis.'

The use of TIPSY for the 1999 timber supply analysis has eliminated much of the uncertainty associated with the use of the growth and yield model. TIPSY is recognized as a better modelling tool for projecting the volumes of managed stands. Subject to the uncertainty regarding site productivity estimates in the North Coast TSA, which significantly impacts managed stand yield estimates and is discussed under ***site productivity estimates*** and ***minimum harvestable ages***, I am confident that volume estimates for managed stands are adequate for the purposes of this determination.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has reached a harvestable condition, that is, has met minimum merchantability criteria. The minimum harvestable age assumption largely affects when second growth stands will be available for harvest. In practice, many forest stands will be harvested at older ages than the minimum harvestable age, due to economic considerations such as desire for volume optimization, or constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife habitat and water quality.

For the timber supply analysis, minimum harvestable ages were derived using the following criteria:

- the stand volume was required to be at least 375 cubic metres per hectare;
- the stand must have reached 95 percent of its culmination mean annual increment (CMAI); and
- the average diameter at breast height (dbh) of the largest 250 trees per hectare was required to be at least 35 centimetres.

District staff assembled the above criteria in an attempt to approximate the minimum age at which stands were likely to be harvested, given the typical North Coast operating conditions of poor accessibility, difficult ground, expensive harvesting techniques, and in consideration of the product markets.

The limiting factor in the criteria used to define minimum harvestable age was the achievement of the minimum average diameter. Minimum diameter was found to be limiting in five of the managed analysis units, representing 94 percent of the long-term timber harvesting land base for the TSA. Analysis showed that when the diameter criterion was not used, the minimum harvestable age was reduced by an average of 50 years. Sensitivity analyses to test the effect of eliminating the minimum diameter criterion for minimum harvestable age showed the initial harvest level could be maintained for several more decades before beginning the series of declines to a long-term harvest level slightly higher than that projected in the base case.

The criteria used in the 1999 timber supply analysis for the North Coast TSA to determine minimum harvestable ages were less restrictive than those used in the previous analysis. For the previous timber supply analysis, the criteria used were the following: a minimum stand volume of 400 cubic metres per hectare, the stand must have reached 100 percent of CMAI, and the average dbh had to be at least 40 centimetres.

However, the minimum harvestable ages derived for the 1999 analysis are older than those for the previous analysis due to a change in growth and yield models used to predict volumes for managed stands. As mentioned under *volume estimates for managed stands*, VDYP was used to project managed stand yields for the previous timber supply analysis. The ages at which the minimum diameter requirements are reached as predicted by the TIPSY model are much older than those predicted by the VDYP model.

One possible conclusion to be drawn from an assessment of the difference is that VDYP underestimated the ages for second growth stands by some amount in the previous

analysis. However, there is no evidence to support this supposition. Other explanations are possible by evaluating the criteria used to project growth in TIPSY. The managed stand yield model is highly dependent on values for site indices, which—as discussed previously—is a subject of uncertainty in the North Coast TSA. For example, the minimum harvestable age for stands in the western redcedar and hemlock/cedar analysis units with site indices of less than 15 metres was projected to be 300 years in the base case. When the OGSI paired plot adjustments were applied in a sensitivity analysis, the age decreased to 130 years. When the OGSI veteran study adjustments were also applied, the age decreased to 90 years.

District staff believe that the minimum harvestable ages seem realistic for stands on the lower productivity sites (i.e. those with actual site indices of less than 14 metres). However, they do not believe that the minimum harvestable ages estimated for the majority of the timber harvesting land base are reflective of potential site productivity. Given that the derived minimum harvestable ages are heavily influenced by available site productivity estimates, the need for localized site index data is again highlighted.

I have reviewed the information regarding minimum harvestable ages. Although I am satisfied that each of the criteria used is sound and reasonable on its own merit, I am concerned about the old ages derived using the criteria in combination. The analysis results show that the combined impact of the three criteria on minimum harvestable ages is significant. I believe that if the minimum harvestable ages indicated for some of these managed stands—such as the example noted above—were accurate, then there is uncertainty as to whether these stands should be managed for timber production. However, in consideration of the information, and of the uncertainties around site productivity, I believe that the stands in the North Coast TSA exhibit diameter growth greater than that projected in the analysis. District staff agree that managed stands in the North Coast TSA are exhibiting better growth than what is reflected in the analysis.

I again encourage district staff to obtain localized site productivity data to assist with future timber supply analyses. For the purposes of this determination, I recognize that timber supply is likely more favourable than projected in the base case as a result of the flexibility provided by more realistic minimum harvestable age estimates.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

<u>Expected time for forest to be re-established following harvest</u>

- regeneration and regeneration delay

In most areas of the North Coast TSA, a significant number of trees regenerate naturally in openings, a process referred to as ingress. Western hemlock is the main species that consistently seeds well into openings. To ensure a good species mix and reduce stocking gaps in a regenerating stand, the majority of harvested areas are planted with a mix of species which may include western redcedar, sitka spruce, balsam and yellow cedar. The planting combined with the ingress leads to high initial densities in most stands in the North Coast TSA.

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In timber supply analysis, regeneration delay is used to determine the starting point of tree growth for the yield curves which project volumes over time.

In the timber supply analysis, regeneration delay was assumed to be one year for western redcedar-, hemlock/cedar- and cottonwood-leading stands, and two years for hemlock/balsam- and spruce-leading stands. District staff have reviewed data from the Integrated Silviculture Information System (ISIS) and Major Licence Silviculture Information System (MLSIS) and found that the average experienced regeneration delay was 1.2 years. Based on this information, they are confident that the assumptions in the analysis regarding regeneration delay reasonably reflect current practice.

I am satisfied that regeneration delay was appropriately modelled in the analysis, and have made no adjustments on this account.

- impediments to regeneration

Impediments to regeneration that are not accounted for in the analysis could increase the uncertainty in the growth and yield assumptions used in the timber supply analysis. In the North Coast TSA, impediments may include geoclimatic site factors or damage from insects, deer, voles, or porcupines.

ESA data identifies areas considered to be difficult to regenerate. In the timber supply analysis, 100 percent of the 33 006 hectares labelled as highly sensitive, and 50 percent of the 901 hectares labelled as moderately sensitive for regeneration were excluded.

District staff note that there are minor impediments to regeneration in isolated areas of the TSA. Deer browsing in western redcedar plantations is a concern operationally but is not extensive enough to impact timber supply. Similarly, vole damage to plantations in some years is a concern but research results indicate that the damage does not impact timber supply. Staff state that the only impediment for which there are sufficient losses to possibly lead to timber supply impacts is the damage caused by porcupine feeding.

At the time of the previous determination, concern was expressed about possible impacts to timber supply resulting from porcupine damage to second growth stands. Feeding damage from porcupines had been observed in second growth stands across two-thirds of the North Coast Forest District, and concerns were expressed that the damage might lengthen regeneration delays, lower stocking levels and lower managed stand volume yields. I requested at that time for district staff to 'attempt to resolve the uncertainty with respect to the volumes at risk to porcupine damage, and possible strategies to deal with this threat'. District staff note that studies on the impacts of the damage are ongoing and the effect has not yet been fully quantified. However, they have monitored both the population cycles and damage to stands and conclude that while the problem is still widespread, the impacts to timber supply do not appear to be as great as originally feared. Porcupines feed primarily in second growth stands between 30 and 40 years of age, which indicates concerns are related more to volume or density losses than any impact on regeneration delay. Interim data from the studies indicate that the mortality rate in the most severely affected stands—those in drainages with high proportions of second growth

stands—is not as high as initially feared, as only ten percent of the trees in the stands studied suffered mortality over a ten-year period.

The timber supply analysis did not include any specific adjustments to account for possible volume or density losses as a result of porcupine damage.

I have considered the information regarding porcupine damage to managed stands. I note that the volume estimates for the regenerated stands in the North Coast TSA already include some accounting for volume and stem losses in the form of OAFs, as discussed under *volume estimates for managed stands*. Also, as discussed under *regeneration delay*, initial stand densities for second growth stands are fairly high throughout the TSA, largely as a result of the ingress of self seeded trees. High density stands have an inherent capacity to buffer individual stem mortality without impact to total stand yield. District staff confirm that even in the most severely attacked areas, stands are still well stocked.

Given the high initial densities of the majority of regenerated stands in the TSA, I believe that loss of 10 percent of the trees in a stand is not likely to result in a significant impact to the total stand yield. I expect that the end result at the stand level will be the same volume yield as if the stand had not sustained porcupine damage, but the volume might be distributed over fewer, larger diameter stems. In consideration of all of this information, I am satisfied that there is unlikely to be a risk to timber supply on account of this factor, and I will make no adjustments to the base case projection.

I encourage district staff to continue to monitor the impact of porcupine damage in an attempt to better quantify potential impacts which can be factored into future determinations.

- not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are those areas where timber has been removed, either by harvesting or by natural causes, and a stand of suitable forest species and stocking has yet to be established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the classification is 'backlog' NSR. All other NSR is considered 'current' NSR.

In the timber supply analysis, 2100 hectares of current NSR and 3465 hectares of backlog NSR were identified. It was assumed that all of the current NSR would be restocked within standard regeneration delay time limits. For the backlog NSR areas, based on input from district staff, it was assumed that a portion was already satisfactorily restocked, some would be regenerated within 10 years, and that the remainder would be reclassified to lower stocking class. The latter areas were excluded from the land base contributing to timber supply.

District staff have reviewed the information regarding NSR and indicate that the assumptions applied in the analysis are appropriate and reasonably reflective of current operational values. They indicate that all backlog areas which were feasible and economical to treat in the North Coast TSA have been treated. Those areas likely to be reclassified are expected to contain between 40 and 60 percent stocking.

I have reviewed the information and I am satisfied that the assumptions applied in the timber supply analysis regarding NSR areas were appropriate and reasonably reflect current conditions in the TSA, and I have therefore made no adjustments on account of this factor.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

- silvicultural systems

For the purposes of the analysis, it was assumed that all harvesting would be done using clearcutting silvicultural systems. Other requirements under the Forest Practices Code for riparian reserves and wildlife tree patch areas, as well as forest cover constraints such as green-up and adjacency restrictions were also factored into the analysis and are discussed further under the appropriate sections in this rationale.

Clearcutting continues to be the predominant silvicultural system used in the North Coast TSA. At the time that the data package was assembled, it was estimated that approximately one percent of harvesting was through the use of partial cutting systems. District staff note that recent operational plans prescribe an increased level of variable retention harvesting. Further commitments made by major licencees, as well as the SBFEP in the Vancouver Forest Region to conduct a certain proportion of their operations through alternative silvicultural systems is expected to lead to increasing use of these systems over time.

District staff note that the use of partial cutting systems may aid in harvesting of visually sensitive areas, in which there is currently little performance. This is discussed later in this rationale under *visually sensitive areas*.

I note that the trend towards increased reliance on alternative silvicultural systems is consistent with trends in other coastal areas. As increased reliance on partial cutting silvicultural systems occurs, timber supply may become more constrained, and the implications of this will need to be reflected in future analyses. However, for this determination I am satisfied that current practice was modelled appropriately and have made no adjustments to account for any uncertainties in this factor.

I note that provincially there is a need for additional research in order to allow better predictive capability for modelling growth and yield from alternative silvicultural systems. A different type of data with different modelling assumptions will likely be required in the future and the impacts in terms of timber supply can be evaluated at that time.

- incremental silviculture

Incremental silviculture includes activities such as commercial thinning, juvenile spacing, pruning, fertilization, and genetic improvement that are beyond the silviculture activities required to establish a free-growing forest stand.

Very little pruning occurs in the North Coast TSA and none was assumed in the analysis. District staff indicate that the assumptions regarding pruning are appropriate and reflective of current practice.

1) genetically improved seed

Requirements under the Forest Practices Code include the direction to use genetically improved seed orchard seed (class A seed) for regeneration where available.

A limited amount of genetically improved seed is available for the North Coast TSA, and is used where possible. The base case for the timber supply analysis assumes no use of genetically improved seed in the TSA. Given that the amount of class A seed actually in use is so small as to have a negligible impact on timber supply, I am confident that the assumptions used in the analysis are appropriate. For the future, I note that there may be a potential to improve mid- to long-term timber supply through the use of genetically improved seed. I encourage the district to monitor the direction of provincial seed orchard capacity with respect to the applicable seed planning zones and required species. If better information is available for the next timber supply review then the gains can be factored into the analysis at that time.

2) fertilization and juvenile spacing

Fertilization is the application of nutrients in a stand to enhance the growth of individual trees. No operational fertilization has occurred to date in the North Coast TSA, and none was assumed in the timber supply analysis. District staff state that the use of fertilization is not expected to increase in the future, and that in any event data has shown inconsistent results for the types of stands occurring in the TSA.

Juvenile spacing involves cutting less desirable trees within a young stand to reduce competition among the residual trees for water, nutrients and sunlight. Trees cut during juvenile spacing are not usually removed from the site, and the volume does not contribute to timber supply. Spacing can have many potential benefits, including meeting biodiversity or wildlife habitat objectives, maintaining or enhancing forest health, managing species composition and stand structure, increasing stand value and offering employment opportunities for small operators.

In the timber supply analysis, it was assumed that 200 hectares per year of high productivity spruce, high productivity hemlock/balsam, and medium productivity hemlock balsam stands were juvenile spaced to 700 stems per hectare throughout the analysis horizon. This estimate was derived by district staff based on an assessment of past practices in the TSA.

District staff state that the level of spacing in the North Coast TSA has dropped in the past two years as a result of reduced funding for incremental silviculture. However, they note that more funding may become available for incremental silviculture in the future as the backlog program nears completion.

A sensitivity analysis conducted that evaluated the impact to timber supply of juvenile spacing to 700 stems per hectare almost all stands showed that the initial harvest level

could be maintained for an additional three decades before beginning a similar series of declines to those in the base case. It is unusual to see such a significant timber supply response in the short-term to an increased level of juvenile spacing. In many units where the minimum harvestable ages are old, as is the case in the North Coast TSA, and rotation ages are long, any analysis of the return on investment conducted at the stand level would indicate the potential timber supply benefits are not worth the costs. In this unit, it would appear from the sensitivity analysis results that there may be a beneficial forest level response to juvenile spacing.

However, the benefits suggested are dependent on the site indices assigned to managed stands, which as discussed under *minimum harvestable ages* and *site productivity estimates*, are subject to much uncertainty in the North Coast TSA. On stands with low assigned site indices, spacing allows minimum diameters to be realized at much younger ages, thereby allowing stands to reach minimum harvestable age much faster. As it is believed that the site index estimates for managed stands in the North Coast TSA are greatly underestimated, it is quite likely that the timber supply benefits indicated by the sensitivity analysis are overestimated, and would be less once the reliability of the site productivity estimates is improved through localized data collection.

For this determination, I am satisfied that current practice was modelled appropriately and that there is no uncertainty in this factor which would pose a risk to timber supply. As additional information about the stand dynamics and site productivity becomes available, it can be factored into future analyses. It should be clearer once such additional information is available whether forest level responses to increased juvenile spacing are indeed possible in the TSA.

3) commercial thinning

Commercial thinning is a partial cutting silvicultural system in which some volume is removed from an immature stand after components of the stand have reached a merchantable size. The volume removed during the commercial thinning is sold and therefore contributes to timber supply. Commercial thinning activity may not significantly affect overall timber supply but does offer increased flexibility with respect to timing and location of harvest.

There was no commercial thinning assumed during the timber supply analysis. Very little commercial thinning occurs in current practice in the North Coast TSA, as it is most appropriately conducted in 40 to 60 year old stands and less than ten percent of the timber harvesting land base is occupied by stands in this age class. In addition, district staff indicate that the steeper, rugged and inaccessible terrain prevalent in the TSA somewhat precludes commercial thinning.

I am satisfied for this determination that the assumptions applied in the analysis were appropriate and reflective of current practice in the TSA. Any changes in operational practices which occur over time can be reflected in future analyses.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

- utilization standards

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. In the timber supply analysis, the utilization standards assumed in the base case for all existing stands over 120 years of age were a minimum 17.5-centimetre diameter at breast height (dbh) with a 30-centimetre maximum stump height and 10-centimetre minimum top diameter inside bark. For existing stands 120 years of age or less and for future regenerated stands, the minimum dbh standard used was 12.5 centimetres.

These assumptions are consistent with regional standards and with those applied in other coastal units. District staff note that operationally for existing older stands the utilization standard for minimum top diameter inside bark is relaxed to 15 centimetres. Assessments in other coastal units have shown this variation in assumptions for top diameter to have a negligible impact on yield at harvest.

I have reviewed the information regarding utilization standards and am satisfied that the assumptions used in the base case are a reasonable representation of current practice.

- decay, waste and breakage

For managed stand yield curves, as previously discussed (see *volume estimates for managed stands*), the TIPSY model incorporates OAFs that account for anticipated decay, waste and breakage.

For existing stand yield curves, the VDYP model which is used to project volume incorporates estimates of volume of wood lost to decay, waste and breakage. Decay losses are built into the volume estimates, while standard waste and breakage factors are incorporated into the analysis when developing VDYP yield curves. These estimates of losses have been developed for different areas of the province based on field samples. In the analysis for the North Coast TSA, the factors provided were those for Forest Inventory Zone (FIZ) A.

As was mentioned under *deciduous species*, there is currently limited information about the appropriate decay, waste and breakage estimates to apply for red alder. As the possible utility of this resource is explored, information may become available on these factors which can be applied where appropriate in future analyses.

I have reviewed the information regarding decay, waste and breakage estimates and am satisfied that there is no uncertainty around these factors which poses a risk to timber supply for this determination.

- harvest profile

At the time of the previous determination, concern was expressed regarding whether the harvested species were representative of the profile of species occurring on the land base. Comparison of harvest billing reports and inventory data appears to substantiate this concern. Review of the species associated with harvest billing volumes and species delineated in the forest cover data implies that the proportion of each tree species harvested since 1984 has not reflected the proportional volumes of species which occur on the operable land base. However, harvest billing reports reflect actual volumes from each species harvested, whereas forest inventory data provides information only on leading species for each stand. Due to inconsistencies in the way information is presented, it is thus extremely difficult if not impossible to make a meaningful comparison.

In addition, as discussed under *operability*, the majority of harvesting in the TSA has occurred thus far in the portion south of the Nass River. Local knowledge suggests a lower proportion of the better sites, as well as greater proportions of hemlock in the harsher climate and more rugged terrain of the northern portion of the TSA.

A submission was received expressing concern that stands of higher site productivity were supporting more of the TSA harvest than they should given their relatively small representation in the timber harvesting land base. It is believed this conclusion was drawn from review of area statistics presented in Table A-3, Analysis Unit Characteristics in the North Coast Timber Supply Area Analysis Report. In this table the ratio of young forest area (presumed to be of harvesting origin) to old forest area is larger in the higher site productivity analysis units.

This type of comparison is believed to be unreliable, because site index estimates in the inventory file for old and young stands (21 years of age or less) come from different sources with different biases and sources of error. More specifically, it is known from research conducted throughout the province, that site index estimates for old stands tend to be conservative.

To further test the supposition that high productivity stands were overemphasized in the recent harvest profile, district staff reviewed original forest cover attribute site index estimates (FCSIs) for a sample of openings recorded in MLSIS/ISIS. This sample indicated that more than half of the openings were situated on sites with FCSIs below 15 metres, whereas the inventory statistics for the timber harvesting land base suggest that only 30 percent of the timber harvesting land base is represented by stands with site indices below 15 metres. Furthermore, this sample indicates most of the site indices estimated by silvicultural prescriptions or regeneration surveys have much higher site productivity levels than the original opening forest cover attributes indicated.

District staff indicate that there are no performance concerns in the stands mentioned in the public input. I am mindful of the expressed concerns around harvesting performance in the visually sensitive areas and the northern portion of the TSA, which are discussed elsewhere in this rationale under *economic and physical operability* and *visually sensitive areas*.

I have considered the information and results of the district review on harvest profile, and see no evidence to indicate that the profile of stands on the timber harvesting land base—both in terms of species composition and site productivity—is not being harvested in the North Coast TSA. I am satisfied that there are no issues around this factor which would impact on this determination, and make no adjustments on this account.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

To manage for resources such as water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height), and prescribe minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. These requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

- cutblock adjacency/green-up

Objectives for forest cover and cutblock adjacency guide harvesting practices in order to address resource values such as wildlife, water, and visual quality. The adjacency objectives modelled in the analysis address minimum green-up height required before an adjacent area may be harvested, and the maximum area permitted to be less than the minimum green-up height.

The FSSIM timber supply analysis model does not represent the adjacency constraints explicitly. Rather, in the analysis any constraints were modelled implicitly by limiting the amount of area on which trees may be below a specified green-up height. In the integrated resource management zone—which covers approximately 70 percent of the timber harvesting land base—no more than 33 percent of the area in each landscape unit could be occupied by stands with an average height of three metres or less at any one time.

Sensitivity analysis that assessed the impact to timber supply of increasing or decreasing adjacency requirements showed that the base case harvest levels are not constrained by the adjacency or green-up constraints modelled in the base case, nor were they sensitive within the ranges posed by the data package. Further sensitivity analysis determined the base case harvest forecast was unaffected by the adjacency constraint until the area allowed to be less than three metres in height was reduced to 18 percent.

District staff believe that the green-up constraints for the IRM zone were modelled appropriately in the analysis. Operationally, a harvested area in the IRM zone must meet the three metre green-up requirement before an adjacent area can be harvested.

I have reviewed the information regarding cutblock adjacency and green-up and am satisfied that there are no issues which would pose a risk to timber supply.

- visually sensitive areas

Careful management of scenic areas along travel corridors and near recreational sites is an important IRM objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs). To achieve this, visual landscape inventories are carried out to identify, classify and record those areas of the province that are visually sensitive.

To achieve VQOs, limits are placed on the amount of visible disturbance that is acceptable in visually sensitive areas. Guidelines to meet VQOs include setting a maximum percentage of a landform allowed to be in a disturbed state at any one time, and setting visually effective green-up (VEG) targets that must be achieved before additional harvesting is permitted. VEG refers to the stage at which a stand of forested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint. To meet this requirement, the green-up height and associated age within visually sensitive areas might be different than the green-up height applied to non-visually sensitive areas.

In the North Coast TSA, scenic areas were made known under the Forest Practices Code in 1997 by the district manager. VQOs for the areas have not yet been established and the district manager has given licensees guidance to use the recommended VQOs according to the current visual landscape inventory. The district staff completed a visual landscape inventory in 1995 which included recommended VQOs for the scenic areas. In 1998, district staff made adjustments to these recommended VQOs for some areas in order to reduce the timber supply impacts from the management for visually sensitive areas. These revised VQOs were used in the 1999 timber supply analysis. In general, although more total area has been mapped and included in management for VQOs since the first timber supply review, some area was reclassified to modification to be consistent with the management objectives for the areas.

In the timber supply analysis, a total of 30 percent of the timber harvesting land base was assumed to be managed for VQOs. Approximately half of this area, or 15 percent of the timber harvesting land base—the Inside Passage and Skeena River Corridor Scenic Areas—has recommended VQOs of preservation, retention and partial retention and is considered highly visually sensitive. The remainder of the area managed for VQOs—the Portland Canal, Work Channel, Douglas Channel and Gribbell Island areas—has recommended VQOs of modification.

Separate zones were created for the various VQO areas, and the constraints were applied as the maximum percentage of area in the productive forest land base that could be occupied by stands less than a specific height. The restrictions for green-up were applied to the entire productive forest land base within each landscape unit because disturbance

restrictions in visual areas apply to the entire viewscape regardless of operability. For the analysis, it was also determined that values at the maximum end of the range for permissible disturbance—rather than the midpoint of the range—would be more reflective of current expectations in operational practice given good visual design principles. The constraints applied were as follows:

Zone	Area	Maximum allowable disturbance (%)	Visually Effective Green-up Height (m)
Preservation	Inside Passage, Skeena River Corridor	1	7
Retention	Inside Passage, Skeena River Corridor	5	7
Partial Retention	Inside Passage, Skeena River Corridor	15	7
Modification	Portland Canal /Work Channel, Douglas Channel/Gribbell Island	25	4

District staff state that the constraints applied in the analysis for visually sensitive areas are reflective of current operational constraints, and that there has been reasonable performance in the visually sensitive areas with modification VQOs. However, they note that very little harvesting has occurred in the preservation, retention, and partial retention visually sensitive areas since the scenic areas were established. During the past 15 years, the only harvesting which has occurred has been along the Skeena River and Kumealon Inlet by International Forest Products, and along the Inside Passage at Halfway Creek where Thompson Industries successfully harvested in some stands in the partial retention zone. The harvested areas were consistent with good visual design for this zone. However, no harvesting activity has been proposed or occurred since that time, and the total area harvested is very small. Some harvesting has since been proposed in the zones by other licensees, but the proposals do not make an effort to address the sensitivity of the visual resource.

Sensitivity analysis conducted to assess the impact to timber supply of deferring harvest from all visually sensitive areas for 40 years showed that base case harvest levels were unaffected.

International Forest Products Limited questioned the need for a 7 metre greenup height in visually sensitive areas, believing that 6 metres would be more appropriate. District staff state that the high sensitivity of the visual resource as well as the steepness of the terrain dictate the use of a 7 metre green up height. The visually effective green up height used in the analysis is an average value for each scenic zone. District staff note that operationally, VEG heights may be reduced on a block by block basis if good visual design techniques such as mitigation of visual impacts or blending with the natural landscape are used, or if the block occurs on a gentler slope.

International Forest Products Ltd. also expressed concern about the timber supply impacts of managing for visual sensitivity. Given the lack of performance in these areas, I note that it is very difficult to assess the operational implications of management for visual quality. As stated previously, there have been few proposals for harvesting in the area and those received recently have not been consistent with appropriate management practices for visual sensitivity.

I am aware of the increased costs of operating in visually sensitive areas. However, in highly visually sensitive areas such as the Inside Passage it should be clear that the values associated with visual quality are paramount and timber harvesting must occur in a manner that does not diminish these values. I am also aware that to date, the use of alternative silvicultural systems—which can increase harvesting flexibility in visually sensitive areas—comprises less than one percent of the harvest in the TSA.

I have considered the information regarding visually sensitive areas and am satisfied that current practice was appropriately reflected in the analysis for the modification VQO areas, which comprise 15 percent of the timber harvesting land base. However, I am extremely concerned about the impacts over time of a lack of harvesting performance on the 15 percent of the timber harvesting land base covered by the retention, partial retention and preservation VQOs. Continued avoidance of harvesting on such a significant proportion of the land base places greater pressures on other portions of the timber harvesting land base. In addition, harvesting in visually sensitive areas must be dispersed over time, which becomes increasingly difficult when areas are avoided for long time frames. The VQOs recommended for these highly visually sensitive areas are consistent with the value of the scenic resource and do allow for harvesting activity without compromising visual values. Inclusion of these areas in the timber harvesting land base for the purposes of the timber supply review assumes that this portion of the land base will be developed in an appropriate, timely manner consistent with the resource values. If this is not the case, then these areas should be excluded from contributing to timber supply.

I note that if operational performance in these areas does not occur in the near future in a manner which respects the visual values, then I may consider excluding these areas and their contribution to timber supply in a future determination. Exclusion of these areas from the land base assumed to contribute to timber supply would lead to a reduction in the size of the timber harvesting land base by 15 percent, which will have significant implications for timber supply. In consideration of the risks posed to timber supply, I am considering a partition to these areas, and will discuss this further under *partitions* and 'Reasons for decision.'

- recreation features

The North Coast TSA has significant tourism and recreation potential, largely as a result of the scenic values in the area. The majority of recreational activities that occur in the TSA are marine-based activities, such as fishing, boating and kayaking. A major cruise ship route exists along the Inside Passage, and the area is popular for sailboats, particularly in summer months.

Given the nature of the recreation activities in the North Coast TSA, the consideration of scenic values—as discussed under *visually sensitive areas*—provides significant accounting for recreational values. Any areas designated in the ESA data as sensitive for recreation were not explicitly removed from the timber harvesting land base as it was assumed that the accounting in the analysis for visual sensitivity also provided accounting for management of these areas.

There are three recreation sites and three recreation trails within the TSA, all of which are outside the timber harvesting land base assumed in the analysis.

Public input received on the analysis report expressed the opinion that the AAC should be reduced because of the growth in tourism and ecotourism. This input stated that these industries would be harmed by maintaining the AAC at the level projected in the analysis. In response, I note that the assumptions regarding resources in the timber supply analysis has already provided accounting for a broad range of values other than timber production, including wildlife, recreation, visual quality and water quality. Recreation and tourism considerations are also considered in the accounting for visual quality in the analysis. I do not believe that timber production and tourism are mutually exclusive activities, and management under the Forest Practices Code is intended to ensure that resource values are not unduly compromised by harvesting.

I am satisfied that recreation was appropriately accounted for in the analysis and that there is no need to make any adjustments in my determination on account of this factor.

- *cultural heritage resources*

Cultural heritage resources in the North Coast TSA include archaeological sites as well as traditional use sites. Archaeological sites contain physical evidence of past human activity, and may include culturally modified trees, shell middens, settlement sites, petroglyphs, pictographs, lithic scatters, stone tools, burial sites, caves and basketry. Traditional use sites may not necessarily contain historical physical evidence and may be in current use by a First Nation. No sites in the North Coast TSA have been designated as provincial heritage sites under the *Heritage Conservation Act*.

Archaeological overview (AOA) mapping was conducted in the North Coast TSA in 1995 and 1996 for all licensees' administrative areas. High, moderate or low ratings for archaeological potential were assigned to the majority of the TSA. The AOA was expanded in March 2000 to include the entire TSA. A significant portion of the operable land base has been classified as high or moderate potential for existence of archaeological sites or resources. Due to financial resource constraints during the mapping, it is expected that the AOA will require additional field verification, as well as additional First Nations input, such as the incorporation of Traditional Use Study (TUS) data. No TUSs have been completed to date in the North Coast TSA, although three studies have been initiated and preliminary mapping has been submitted to the BCFS. The feasibility of incorporating TUS data will be dependent on final information sharing agreements which are to be negotiated near the end of each project. It is anticipated that more data will be available for the next timber supply review, and management strategies as well as potential impacts to timber supply may be better quantified at that time.

District staff believe that many of the cultural heritage resources in the TSA exist in riparian areas. Staff indicate that those resources existing in riparian management areas are adequately accounted for with the riparian reserve and management zone reductions applied in the analysis. Some cultural resources such as culturally modified trees occur outside of riparian management areas, including along the ocean shoreline. No specific accounting for these resources was made in the timber supply analysis. District staff believe that the analysis assumptions were appropriate given the lack of available information.

Operationally, although it would assist with better management of the resources, staff note that it has been cost prohibitive to conduct a full inventory of culturally modified trees. In current practice, management for located archaeological resources is handled in the operational planning process. Measures are taken whenever possible to avoid the identified archaeological resource, including boundary amendments, relocation of roads or dryland log sorts, or incorporation of the resource feature into wildlife tree patch reserves. Occasionally, where avoidance of archaeological sites is not possible, the Ministry of Small Business, Tourism and Culture may grant an alteration permit to licensees to remove the site.

If a cutblock is proposed in an area described by the AOA as having high archaeological potential, and the district manager believes that an assessment is necessary to adequately manage and conserve the archaeological resources, archaeological impact assessments (AIAs) are conducted. AIAs typically contain management recommendations that the Ministry of Small Business, Tourism and Culture may approve or change for inclusion in a cutting authority.

Staff state that the management required to protect archaeological resource values does not yet significantly constrain or preclude operations. To date, there has been little impact on operations because site alteration permits are attainable and because many of the resources have been located in riparian areas. However, staff anticipate that future impacts to timber supply could result from management for cultural heritage resources, but that there is not enough information to validate or quantify this concern at this time.

I have considered the information regarding cultural heritage resource values. From discussions with district staff, I believe that the management of these areas is being conducted appropriately at the operational planning level. I am satisfied that the accounting in the analysis for riparian values also generally addresses the impacts of management for cultural heritage values in riparian areas. It is possible that additional impacts to timber supply as a result of managing for these resources will occur. Further operational experience should provide more information that can be incorporated into future determinations. In particular, any further field verification of AOA classifications and incorporation of TUS data should provide better information for the future. I also encourage district staff to monitor management at the operational level to provide a better future assessment of expected timber supply impacts.

- community watersheds

The Forest Practices Code provides a definition and management considerations for community watersheds. There are six community watersheds in the North Coast TSA, totalling 9937 hectares. Only two of the watersheds contain area within the timber harvesting land base, for a total of 498 hectares.

In the timber supply analysis, there were no specific forest cover or other constraints applied to account for management in the community watershed areas. The areas were subject to the forest cover constraints applied to the IRM areas, where no more than 33 percent of the area could be less than three metres in height at any one time.

Operationally, no harvesting has occurred to date in any of the community watersheds. District staff note that no harvesting plans have been submitted for any of these areas and the expected management regime is not yet known. However, given the primary objective in these areas to protect the water quality, it is likely that forest cover constraints eventually applied in these areas would be similar to those applied to community watersheds in other units, consistent with the guidelines provided in the *Community Watershed Guidebook.*

Given that only 5 percent of the total area in community watersheds is considered to contribute to timber supply, and that in any event the area comprises only 0.5 percent of the timber harvesting land base, I am satisfied that there is no risk posed to timber supply as a result of the analysis assumptions for these areas. As better information comes available over time it can be incorporated into future analysis. For the purposes of this determination, I have made no adjustments on account of this factor.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the RMZ and RRZ make up the entire riparian management area. For each stream, a stream class (e.g., S1) described in the *Riparian Management Area Guidebook* is determined based on presence of fish, occurrence in a community watershed and average channel width criteria. The stream class is used to estimate the area required to be retained in the RRZ and the basal area to be retained in the RMZ. Similar criteria are used to classify and estimate RRZ and RMZ retention for lakes and wetlands.

In the timber supply analysis, average coastal figures were used to account for riparian reductions, since no local data was available at the time that the data package was prepared to provide estimates for RRZs or RMZs. A land base reduction of 4.8 percent based on the figures from the *1996 Forest Practices Code Timber Supply Analysis Report,* which were derived using data from the *Wildstone Report,* was applied in the analysis to account for RRZs.

District staff believe that the reductions applied to account for RRZs in the analysis adequately reflect current practice. I am familiar with the data in the *Wildstone Report*

upon which the values used in the analysis were based, and note that the average values from the report correlate well with RRZ areas found in other coastal units. I am therefore satisfied that the analysis used the best available information for estimating the reserve zones, and have made no adjustments on this account.

To account for RMZs in the analysis, a volume reduction of 4.2 percent was applied to all volume curves, based again on the average coastal stream density figures from the *1996 Forest Practices Code Timber Supply Analysis Report.* District staff believe that the volume reductions applied in the analysis are a better reflection of current management than an area reduction.

Public input including that from the Prince Rupert Environmental Society expressed concern about management for riparian values. One submission stated that current practices in RMZs do not appear to be sufficient to protect the resource. MELP staff also expressed concern on this issue, noting that in current practice some licensees do not reserve adequate portions of the RMZ, and that best management practices are not, in their opinion, being followed. They state that although the reserve zones tend to fall outside the cutblock boundaries, portions of RMZs occur within boundaries and are frequently clearcut.

District staff indicate that in practice, basal area retention levels in the RMZs within cutblock boundaries tend to be less than reflected in the analysis report. However, they indicate that the majority of RMZs are located outside of cutblocks. A review of silviculture prescription data conducted in 1997 by district staff found that the majority of class S1-S4 streams were located outside of block boundaries. They note that licensees will frequently locate cutblocks upslope to avoid harvesting near fish streams. However, if an RMZ falls within the boundaries of the cutblock—particularly for class S4, S5 and S6 streams—district staff note that it is frequently harvested using clearcutting systems and no volume retention.

I note that—although there is no legal requirement to retain a specific volume of timber in the RMZ—the intent of the management zone under the Forest Practices Code is to ensure integrity of the reserve area, and that if this is not being achieved operationally then practices should be reviewed to ensure adequate resource protection. The high value of the riparian resource—as well as the presence of other resource values such as cultural heritage values or biodiversity values that also exist in riparian areas—will dictate the appropriate practices in riparian management areas.

International Forest Products Limited commented that they had doubt about the applicability of the coastal averages for RRZs and RMZs to the North Coast TSA, and expressed willingness to contribute to further study to clarify the appropriate retention values to apply in future analyses.

I have considered the information about riparian management in the North Coast TSA. Although I am aware from the discussions that the assumptions in the timber supply analysis do not necessarily reflect current practice, I believe that the protection of the resource is better reflected by the values applied in the analysis than through the application of a lesser reduction to reflect what has been observed in current practice, in particular as local data is not available. In addition, I believe that retention levels in

RMZs over time will reflect what is required to adequately protect the resource values. I note that this issue is being examined at a provincial level to attempt to quantify the measures required to ensure the resource is adequately managed.

For this determination, I am satisfied that the reductions applied in the analysis to account for RRZs both reflect current practice and are appropriate to ensure protection of the resource. For RMZs, for the reasons discussed previously I am not going to make any adjustments on account of this factor. However, I encourage BCFS and MELP staff to confirm the applicability of the provincial coastal values by conducting a local study. There is a strong need for further inventory work and local data, perhaps in cooperation with the licensees in order to provide better information needed for the next determination.

- *wildlife habitat and identified wildlife*

No specific exclusions were applied in the timber supply analysis to account for wildlife habitat, as it was assumed that the large proportion of area available outside the land base assumed available for timber harvesting (as reflective of the numerous constraints for ESA's, operability, visual sensitivity, riparian habitat, etc.) would adequately meet the habitat needs of the wildlife species in the North Coast TSA.

The Conservation Data Centre of BC maintains forest district tracking lists, which name those species and plant associations that are known to occur, strongly expected to occur, or that have occurred in the past within a given forest district. The Identified Wildlife Management Strategy (IWMS) addresses habitat management for certain of these at risk species, as described in the next section of this rationale.

'Identified wildlife' refers to those species at risk (red- or blue-listed) and to regionally significant species (yellow-listed) that are considered to be sensitive to habitat alteration associated with forest and range practices, and that have not been adequately accounted for with existing management strategies, such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. 'Species at risk' as defined under the Forest Practices Code also includes those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is that by addressing the habitat needs of regionally important wildlife early on, the possibility that they will become listed provincially as threatened or endangered at a later date may be avoided.

Volume I of the Identified Wildlife Management Strategy (IWMS) was released in February 1999 and details several species which occur or potentially occur within the North Coast TSA, and which require future consideration, including: bull trout, tailed frog, trumpeter swan, northern goshawk, sandhill crane, marbled murrelet, ancient murrelet, Cassin's auklet, Keen's long-eared myotis, fisher, grizzly bear and mountain goat. Volume II, which has not yet been released, may identify additional species for consideration.

Species identified under the IWMS will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures, or through other management practices specified in higher level plans. Specific wildlife habitat areas or

management strategies for identified wildlife species have not yet been established in the North Coast TSA. Government has limited the impact of management for identified wildlife over the next two years to a maximum of one percent of the short-term harvest level for the province.

The 1999 timber supply analysis did not account for identified wildlife in the base case, as no wildlife habitat areas have yet been established.

When WHAs are established, and general wildlife measures are implemented, the impacts of management for identified wildlife will be much clearer. In addition, measures will be assessed over time to determine if they are sufficient to adequately protect identified wildlife species. The strategy for managing for identified wildlife and associated timber supply impact thresholds may be changed after an evaluation, but I cannot reasonably speculate on the outcome of such a process. In addition, I cannot speculate about decisions that may be made during future land and resource management planning processes with respect to identified wildlife. Any future changes to the required measures for identified wildlife species that result in impacts to timber supply, either under the IWMS or according to approved plans, will be incorporated into future analyses.

For this determination, it is not possible to specify the exact location or precise amount of habitat area that will be required within the timber harvesting land base to implement the IWMS. However, given the Province's commitment to implementing the strategy, and given the policy decisions and projected one-percent impact—and noting the expected occurrence of identified wildlife in this TSA—it is necessary and appropriate to account for an expected but not fully quantified impact on the timber supply. Further, even though the timber harvesting land base in the North Coast TSA is only 6 percent of the total area of the TSA, I feel it is reasonable to consider that the impact to the timber harvesting land base will indeed be close to 1 percent given the terrain, topography and the species involved.

MELP staff note that preliminary mapping to identify WHAs has begun, but no WHAs have yet been identified. I encourage MELP and BCFS staff to work together where possible to ensure WHA placement occurs so that better information can be available for future analyses.

Public input from Prince Rupert Environmental Society expressed concern that there was no provisions made for endangered species or plant communities. Other public input encouraged protection of the area referred to by environmental organizations as the Great Bear Rainforest for grizzly bear habitat.

After reviewing the assumptions from the timber supply analysis, and the contents of the IWMS, I conclude that it is reasonable to expect a future downward pressure on timber supply as a result of the establishment of wildlife habitat areas. The reduction is expected to be less than or equal to one percent, although at this time the exact impact is uncertain. Although no specific sensitivity analyses were conducted to evaluate the impact of this reduction, other results, such as from the analysis of the uncertainty in the size of the timber harvesting land base, indicate that there is not likely to be any impact to short-term timber supply due to this factor alone. For this determination, I am mindful of the

downward pressure and will account for it under 'Reasons for decision' later in this rationale.

- biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the stand and landscape levels.

1) stand-level biodiversity

Stand level biodiversity management includes retaining reserves of mature timber, or wildlife tree patches (WTPs), within or adjacent to cutblocks to provide structural diversity and wildlife habitat. The *Biodiversity Guidebook* makes recommendations for percentages of area to be retained in WTPs, based on specific assumptions about the land base.

In the preparation of information for the timber supply analysis, district staff reviewed silviculture prescription data to assess the area being reserved in WTPs in current practice. The results of the assessment indicated that WTP requirements were being met from adjacent suitable habitat outside the cutblock boundaries. As a result, there were no specific reductions applied to account for WTPs in the timber supply analysis.

District staff are satisfied that the assumptions applied in the analysis are an appropriate reflection of the operational conditions in the TSA. The topography in the North Coast TSA is characterized by V-shaped drainages, with the timber harvesting land base located in a narrow strip of forested area between steep rock walls and riparian areas in the valley bottoms. Cutblocks tend to be long and narrow, with openings less than 500 metres across. Given the large proportion of inoperable terrain and presence of riparian reserves and surrounding timber harvesting land base, the distance between forested area is rarely great enough to warrant an additional WTP reserve within the cutblock itself.

I have reviewed the information regarding stand level biodiversity in the North Coast TSA, and am satisfied that the assumptions in the timber supply analysis are appropriate and provide adequate accounting for this factor.

2) landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved.

Natural disturbance types (NDTs) are defined according to the frequency of natural disturbance, ranging from recurrent wildfires in the dry interior regions to rare stand-initiating events such as windstorms in the wetter coastal regions. In the North Coast TSA, natural disturbance patterns are largely described by NDT 1 (ecosystems with rare stand-initiating events).

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values.

The *Landscape Unit Planning Guide* outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—which may be employed when establishing biodiversity management objectives for a landscape unit. If a reasonable distribution of options is maintained across the land base, it is generally considered that biodiversity can be adequately maintained in conjunction with the timber harvesting objectives.

The current provincial policy direction provided by the chief forester for assignment of BEOs is to follow guidance provided in the *Landscape Unit Planning Guide.* The guide outlines the proportions of each subregional planning area that should be assigned to each of the three BEOs. The proportions in lower and intermediate biodiversity emphasis can range from 30 to 55 percent, but the average is approximately 45 percent of the area in lower, 45 percent in intermediate, and 10 percent in the higher BEO. This distribution is believed to provide a balance between social and economic impacts and risk to biodiversity. The policy generally followed for timber supply analyses when landscape units and BEOs have not been formally established is to model the distribution of BEOs using this weighted average forest cover requirement.

In the North Coast TSA, interim BEOs have been assigned to each recommended landscape unit through the regional landscape unit planning strategy. However, as the BEOs have not yet been legally established, they were not used in the base case for the analysis. Instead, in accordance with provincial policy, a single weighted constraint for the old-seral stage requirement was applied to each landscape unit based on the anticipated distribution of 10 percent high, 45 percent intermediate, and 45 percent low BEO. A sensitivity analysis in which the interim BEOs were used, instead of the weighted averages applied in the base case, found no impact to timber supply.

For the lower BEO areas, the old seral stage target retention level was drawn down by two-thirds as per the provincial policy. The full retention for old seral in these areas was met by the end of three rotations. A sensitivity analysis in which the full old seral requirement was applied immediately showed no impact to timber supply.

The low sensitivity of timber supply to changes in the assumptions about landscape level biodiversity is largely as a result of the fact that the old seral objectives for landscape level biodiversity can be largely achieved from outside the timber harvesting land base. The timber harvesting land base in the North Coast TSA only comprises 15.7 percent of the productive forested land base.

District staff note that operationally, low BEO is assumed for all landscape units as specified in *Higher Level Plans: Policy and Procedures* because emphasis options have not yet been formally assigned.

I have reviewed the information regarding landscape level biodiversity and am satisfied that the assumptions applied in the base case were appropriate and suitable for use in this determination.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Other information

- *study areas*

Under the Protected Areas Strategy, a number of 'study' areas under both Goal 1 and Goal 2 criteria were designated by Cabinet in 1993 for each ecoregion of the province. These study areas have been deferred from harvesting or any other resource activities since 1993. It is the intention of the strategy that a land and resource management plan (LRMP) or plans arising from similar processes in each region will result in recommendations for some study areas to be designated as protected areas.

In the North Coast TSA, there are 51 Goal 1 and Goal 2 study areas covering a total of 107 041 hectares. No harvesting or road building activities have occurred in these areas since 1993. The future status for eight of the study areas—encompassing approximately 26 000 gross hectares—is being addressed through the Central Coast Land and Coastal Resource Management Plan (CCLCRMP), a plan discussed later in this rationale under *land and resource management plans*. The long-term status of the remaining study areas is expected to be addressed in a future LRMP or similar process for the North Coast.

None of these areas were excluded from contributing to timber supply in the analysis as they have not been officially designated as protected areas. The areas contain operable land base or in some cases block conventional access to other operable areas. District staff roughly estimate that there is 3400 hectares of timber harvesting land base currently under study area designation, and another 1250 hectares of timber harvesting land base to which access is blocked by study areas. No harvesting is anticipated to take place in these areas at least until resolution through the CCLCRMP and a North Coast LRMP process.

Until the resolution of outstanding issues and the outcome of the CCLCRMP and a North Coast LRMP and associated decisions on the study areas, operational planning difficulties associated with correspondingly increased harvest rates in other parts of the TSA will likely worsen, as noted in the following section.

Government has not yet made any decision regarding the future long-term status of these study areas, and thus I note that it would be inappropriate to prejudge any decision by excluding these areas for this determination. If any study areas become approved in the future as protected areas, then exclusion of such areas can be factored into future analyses.

However, I am conscious of the potential risks posed to timber supply as a result of the continued exclusion of these areas from harvest. An estimated area of 4650 hectares, or 4 percent of the total timber harvesting land base, is currently unavailable for harvest on this account. If the continued operational deferral of harvesting in these areas begins to place unacceptable harvesting pressures on the stands in other portions of the TSA, thereby placing other resource values at risk, then the district manager may choose to recommend to Cabinet official designation of these areas under Part 13 of the *Forest Act*. If Cabinet chooses to so designate an area, then Part 13 of the *Forest Act* also allows for the chief forester to temporarily reduce the AAC in a unit where a designated area exists through written order. I will discuss this further in the next section *land and resource management plans*.

- pristine watersheds

The BC Land Use Coordination Office defines a watershed in the province as pristine if there is no evidence of post-First-Nation-contact activity or if there are only small openings or selective removal of individual trees, or land clearing which is limited to less than 5 hectares. Pristine watersheds, including sub-watersheds, as defined by LUCO, comprise portions of the North Coast TSA which are affected by the CCLCRMP process.

The avoidance of logging in some pristine watersheds in the central coast area of BC is a condition of participation in the CCLCRMP process by environmental non-government organizations (ENGOs), and no harvesting is currently taking place in these specified areas. Continuation of this avoidance is subject to agreements between licensees and the ENGOs. Some watersheds have been formally approved by government as study areas under the Protected Areas Strategy, as discussed previously under *study areas*.

As part of the CCLCRMP process, a report entitled *A Conservation Area Design for the Central Coast Region of British Columbia* has been prepared by some ENGOS, which recommends the protection of considerable portions of the Mid Coast TSA to the south, as well as approximately 83 300 hectares of the North Coast TSA. This report, and government's own *Revised Study Areas for the Central Coast LRMP Area*, indicate that some changes to the land base of the TSA, through the protection of pristine watersheds and other areas, are being contemplated at the planning stage. The extent of the implications for the land base of the North Coast TSA are as yet unclear.

However, to date, no formal procedure has been undertaken by government to remove any pristine watershed from the land base of the TSA, and the avoidance of harvesting in such areas remains a voluntary, co-operative action between licensees and BCFS district staff. As noted in my 'Guiding principles for AAC determinations', and as discussed in detail in my rationales for a number of AAC determinations, notably for the Fraser TSA in 1995, and as further referenced in a 1998 decision of the BC Court of Appeal, in the case of large scale policy issues affecting land use, until formal decisions are made by government, I do not consider it reasonable to attempt to reflect the potential timber supply implications of their possible but uncertain outcomes in my determination of an AAC under section 8 of the *Forest Act*. If and when formal decisions are taken by government to remove these areas, or parts of them, from the land base of the TSA, at that time I will review the associated implications for timber supply. If the implications

are potentially significant, then if necessary I will determine the AAC for the North Coast TSA at a date earlier than the regular review required by statute.

The avoidance of harvesting discussed so far is either in respect of agreements between industry and environmental groups to facilitate the CCLCRMP, or in respect of study areas approved by government, and in either case is likely to continue until the CCLCRMP process is complete and a plan has been approved. In addition, it is anticipated that an LRMP process for the remainder of the North Coast TSA will be initiated in the very near future. The resulting operational planning difficulties are compounded by the deferral of harvesting in the study areas, as described in the previous section.

As noted above, until such time as government makes formal land-use decisions for these areas, I will not exclude them from consideration in this determination. I therefore recommend that if the operational planning difficulties resulting from avoiding harvesting in pristine watersheds become clearly unmanageable, the district manager should consider taking steps to request that Cabinet specify appropriate areas as designated areas under Part 13 of the *Forest Act*, in order that a temporary reduction might be applied to the AAC for the TSA in respect of those specified areas.

One other possible solution could potentially be found through the reduction, under section 61 of the *Forest Act*, by the minister with the consent of affected licensees, of certain authorised licence volumes. This would require licensees to voluntarily forego operations, and in order to effectively reduce pressures on the rest of the timber harvesting land base, would require that the volume of such reductions not be made available for disposition to persons other than the affected licensees. Decisions on these matters are not within my authority as chief forester.

- land and resource management plans

Strategic plans establish the broader context for operational plans, providing objectives that determine the mix of forest resources to be managed in a given area. There are several types of planning processes which are described as strategic in relation to operational planning processes. Distinction must be made between higher level plans as defined by the Forest Practices Code and strategic land use planning processes such as regional or subregional planning (land and resource management planning). Portions of plans arising from strategic planning processes may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

Land and resource management planning is an integrated sub-regional process requiring public participation that produces a land and resource management plan (LRMP) for review and approval by government. Completed and approved plans establish direction for land use and specify broad resource management objectives and strategies. The objectives defined through the LRMP process can reach higher level plan status under the Forest Practices Code if officially declared as such by government.

The Central Coast Land and Coastal Resource Management Plan (CCLCRMP), which was initiated in 1997 and is expected to be completed in 2001, applies to a portion of the North Coast TSA. The management plan covers a large area of the central coast of BC, including approximately 154 600 gross hectares in the southern portion of the North Coast TSA. The plan is expected to provide details on protected areas, including recommendations on the future status of existing protected study areas, and also recommendations for resource management zones (RMZs). Eight of the protected study areas in the North Coast TSA are addressed by the CCLCRMP, including the Spirit Bear (Goal 1) area and seven smaller Goal 2 areas which in total extend over 26 000 hectares of the TSA. The government has not yet approved any part of the CCLCRMP and therefore none of the recommendations were reflected in the timber supply analysis.

The CCLCRMP covers only a portion of the North Coast TSA. A LRMP process has not yet been initiated for the remainder of the TSA, although district staff expect a process to be initiated in early 2001. Public input received on the analysis report expressed the desire to see such a land use planning process similar to the CCLCRMP to address the values on the rest of the land base.

I am mindful of the ongoing CCLCRMP but note that consistent with my guiding principles it would be inappropriate to speculate on the outcome of such a process. If and when the recommendations from the CCLCRMP or any additional LRMP process which may affect the North Coast TSA are accepted by government, I will incorporate them into future determinations.

- forest development plans and constraints

Licensees in the TSA annually prepare forest development plans (FDPs) which present a realistic timber harvesting and forest development strategy for the upcoming five-year period.

Input received from the Hartley Bay Band Council expressed concern regarding the forest development plan approval process. Although many of their comments related to the operational planning process and are best addressed by the district staff outside of the timber supply review, some comments related to the size of the timber harvesting land base. They believe that the need for licensees to obtain approval for more volume than expected to be harvested at the FDP stage indicates a level of constraint on the timber harvesting land base which is not reflected in the timber supply analysis.

I have considered their concern but believe that the factors described as hindering operational development—related to terrain stability, riparian, water quality, cultural heritage, wildlife, etc. values—are in fact accounted for in the timber supply analysis through the various reductions as well as the forest cover constraints applied to the timber harvesting land base. The definition of the timber harvesting land base in the analysis is intended to approximate the size of the land base upon which the licensees operate in actual practice, but it is to be noted that the analysis is not spatial and cannot pinpoint the location of actual operations. In reality, licensees likely operate both in and outside the timber harvesting land base assumed in the analysis. It is expected that the small areas upon which operations occur outside the timber harvesting land base are roughly

equivalent to the small areas upon which operations do not occur which are inside the timber harvesting land base.

In the event that this is not the case, then adjustments can be made to the timber harvesting land base assumptions to reflect the deviation in future analyses.

- other First Nations considerations

The majority of the North Coast TSA is within the asserted traditional lands of the Tsimshian First Nation. The Haisla also have traditional territories within the TSA, and the Heiltsuk and the Gitanyow have asserted their traditional interests within the district. The Nisga'a Treaty settlement lands also include a portion of the North Coast TSA.

Other than the Nisga'a Final Agreement—the impact of which is discussed earlier in this rationale—there are no treaty settlements pending that may impact the short-term timber supply in the North Coast TSA.

As stated in my 'Guiding Principles', it would be inappropriate for me to attempt to account for any decisions not yet made by government with respect to First Nations. Any decisions which become finalized on the status of lands can be reflected in future analyses.

- partitions

The AAC for the North Coast TSA has not included a partitioned component in previous determinations. However, factors discussed in this rationale cause me to consider a partition for this AAC determination.

There is the issue of the economic operability for the portion of the TSA north of the Nass River. District staff have indicated to me that there has been neither operational activity nor any expressed intention to operate in this area over the past 20 year period, and indeed that the current FDPs for licensees do not indicate any planned operations in the area.

The area north of the Nass River comprised 18 412 hectares of the timber harvesting land base assumed in the 1999 timber supply analysis. As discussed previously, a portion of the land base including area north of the Nass River has since transferred ownership to the Nisga'a Nation. The majority of the 61 000 hectares transferred from the TSA lies in this northern area. The total estimated timber harvesting land base associated with the transferred lands is 5354 hectares, and district staff estimate that 4537 hectares of this lie north of the Nass River.

Timber Supply Branch and district staff conducted an analysis of the changes to the total timber harvesting land base for the TSA as well as to the timber harvesting land base north of the Nass River as a result of the implementation of the NFA. This analysis indicates that 12.2 percent of the timber harvesting land base lies in the northern areas. I am satisfied that it is appropriate to consider a contribution to timber supply from these areas which is approximately equivalent to the land base contribution, and therefore any partition that I establish to the north will reflect the contribution assumed from these areas.

A second concern that causes me to consider the viability of a partition for the AAC in the North Coast TSA is the lack of performance in the preservation, retention and partial retention visually sensitive areas. These VQO zones in which there is no harvesting performance comprise approximately 15 percent of the timber harvesting land base of the TSA. None of these visually sensitive areas lie north of the Nass River.

From examining this information, it is apparent that the proportion of the timber harvesting land base upon which there is no harvesting performance is approximately 27 percent.

In addition to these areas, there are also the study areas which comprise 4650 hectares or four percent of the timber harvesting land base, and upon which harvesting activity is currently deferred.

Resolution of the status of the study areas can only occur through an LRMP or similar planning process which will bring clarity for future management of those areas. However, the majority of both the visually sensitive areas and the area north of the Nass River are currently available for operational planning and timber harvest. I am concerned about the lack of performance in these two areas. If it is true that the visually sensitive areas are being avoided because it is not possible to harvest in them economically, then the areas should be removed from contributing to timber supply and the AAC should be reduced accordingly. BCFS staff indicate that it should be possible to harvest economically with current technology and market conditions in that portion of the land base with preservation, retention and partial retention VQOs. However, no demonstrated performance or intent on the part of licensees exists which would serve to validate this assertion. As with all portions of the land base, annual harvesting performance is not required in the VQO areas; however, over a period of time long enough to include market cycles there should be periodic performance.

In view of the information, I am considering the applicability of a partition in the North Coast TSA to both the stands which lie north of the Nass River, and to the stands in highly visually sensitive areas, which in total comprise 27 percent of the timber harvesting land base. I will discuss this further under 'Reasons for decision.'

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

<u>Alternative rates of harvest</u>

- harvest flow/socio-economic implications

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short-term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always)

lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

Alternative harvest flows were prepared as part of the timber supply analysis. One alternative showed that a non-declining even flow harvest level was possible at the long-term harvest level of 361 000 cubic metres per year. In this alternative, the longer transition from harvesting old growth to second growth as well as the longer time taken to convert existing stands to managed stands results in a lesser total volume available over the analysis horizon.

Another alternative showed that the initial harvest level could be maintained for one more decade than in the base case, if an additional 5 percent mid-term reduction—as compared to the base case mid-term harvest level—was accepted for five decades beginning in period 8.

The sensitivity analyses in which the site productivity adjustments indicated by the OGSI studies were applied showed that a mid-term decline need not occur if the same level of adjustment in site productivity is indeed applicable to the North Coast TSA. Although there is still uncertainty regarding the appropriate level of site productivity adjustment to apply in this TSA, these results indicate that a mid-term decline in harvest levels will not necessarily occur.

Public input was received which stated that the AAC should be immediately set to the long-term level, as illustrated in the non-declining even alternative harvest flow. I have considered the possibility of this alternative harvest flow in my determination. However, I am mindful of the impact on communities of decreasing the harvest level immediately by the 40 percent illustrated in this harvest flow, and believe that such a large reduction would result in unacceptable social and economic consequences, and would not be consistent with the socio-economic objectives as specified by the Minister of Forests.

Other public input commented on the reduced harvest levels experienced over the past few years, believing that this indicates an inability to meet the current AAC for economic reasons and that therefore the AAC should be immediately reduced. However, I note that market cycles typically result in changes in harvest levels, that the cycle over the past few years has resulted in similarly reduced levels of harvesting activity in other units on the coast and—as discussed under *difference between AAC and actual harvest*—I accept the advice of district staff that cut control requirements have been and are expected to be met.

- community dependence on the forest industry

The socio-economic analysis for the North Coast TSA details the impact of timber supply adjustments on local communities and the provincial economy. During the analysis, the level of forestry activity currently supported by timber harvesting in the TSA was evaluated.

The socio-economic analysis for the North Coast TSA indicated that the TSA is one of the few areas of the province where forest-based employment is exceeded by other industrial subsectors. The largest industry has historically been commercial fishing and fish processing, followed by primary forestry and wood products manufacturing. However, the commercial fishing and processing industries have fallen off over the past few years, a trend that is expected to continue for at least the short-term. Prince Rupert is the main administrative and service centre for the region, and the transportation and tourism sectors in the area are growing.

The forestry sector continues to be a major source of employment and wealth to the province and the region. The current AAC of 600 000 cubic metres, if fully harvested, can support a total of 558 person years of direct forestry employment, and a further 697 person years of indirect and induced forestry employment, in the province. Within the TSA itself, the AAC supports 200 person years of direct and 330 person years of indirect or induced employment. In the base case harvest flow, the harvest levels decrease by 10 percent to 540 000 cubic metres per year after 20 years. This reduction in harvest level would result in a reduction in provincial employment of approximately 125 person years.

According to the socio-economic analysis, the current AAC also provides 11.4 million dollars annually to the provincial government. The first reduction in harvest level predicted in the base case results in a 1.2 million dollar reduction in revenue.

I have reviewed the socio-economic analysis and am satisfied that it used a sound methodology to evaluate the community dependencies for the North Coast TSA. I am mindful of the strong dependencies that Prince Rupert and the surrounding communities have on timber supply from the TSA. Any reductions to timber supply—such as those predicted in the mid-term in the base case of the analysis—will affect these communities. I note that the choice of a harvest flow in the base case which maintains the current AAC for as long as possible without causing disruptions in mid- or long-term timber supply is intended to minimize the impact on these communities that are dependent on the timber of the North Coast TSA.

- difference between AAC and actual harvest

Most licencees have some flexibility in their rate of cut during a five-year period referred to as the cut control period. The volume harvested during the five-year period must be within 10 percent of the sum of the allowable annual volumes for those five years. The annual rate of cut must also be within 50 percent of the allowable volume in each year, unless the licence is a timber sale licence or—as is sometimes the case if the apportioned harvest level is less than 50 000 cubic metres per year—exemption has been granted from the annual cut control requirement.

The volumes harvested by major licensees and under the SBFEP are illustrated by the chart below:

Cubic metres per year							
Tenure	allotment	1994	1995	1996	1997	1998	1999
Forest Licences	438 918	400 573 (91%)	300 387 (68%)	398 124 (91%)	464 051 (106%)	299 300 (68%)	354 474 (81%)
SBFEP	149 082	62 084 (42%)	84 188 (56%)	47 850 (32%)	22 309 (15%)	4 387 (3%)	40 541 (27%)
Other	0	12 992	14 257	7 572	11 889	8 652	n/a
Total	600 000	475 699 (79%)	398 832 (66%)	453 546 (76%)	498 249 (83%)	312 339 (52%)	395 015 (66%)

For the major licensees in the TSA, the period between 1994 and 1999 covers portions of two separate five-year cut control periods. In each of these past six years, major licensees have met both their annual cut control requirements, and the five year requirement for the past cut control period (1992-1996 or 1993-1997) was met in all cases. In all but one of the past six years licensees have undercut their allotted harvest volume. However, district staff anticipate that the requirements for the current cut control periods—ending in 2001 and 2002—will also be met by the major licensees.

There are no annual cut control requirements for the timber sale licences issued under the SBFEP. The undercut over each of the past six years has been more significant, with actual volumes harvested between 3 percent and 56 percent of the allotted AAC.

With regard to the SBFEP, the total undercut from the 1992-1996 cut control period was 132 594 cubic metres. District staff note that volumes totalling 370 000 cubic metres in non-replaceable forest licences were sold during 1999 and as a result they expect the current five year cut projections will be met.

The North Coast Forest District also has an active small scale salvage program that is anticipated to average 10 000 cubic metres per year.

Public input was received which stated that since only two thirds of the AAC has been logged in each of the past four years, the operable land base in the TSA is clearly smaller than projected in the analysis, and therefore the operability limits should be re-examined. I point out that operability limits are just one of many factors influencing actual harvest levels, and district staff do not indicate to me that licensees are unable to obtain harvest volumes because of operability concerns. District staff agree that the AAC has been undercut but not to the extent stated in the input, and that many factors have contributed to the reduced harvest levels. Staff note that a decline in world pulp prices and the Japanese wood market, in combination with high development costs have contributed to the lower harvest levels over the past few years. This has been further aggravated by 'log-arounds' of PAS study areas, and other known social controversies associated with operations in the TSA.

I have reviewed the information regarding the current harvest levels in comparison to the AAC for the North Coast TSA. I am mindful of the somewhat depressed harvest levels, but note that they are consistent with harvest levels observed elsewhere on the coast. In

any event, I note that cut control requirements have been met, and there are no issues anticipated with meeting future requirements. I am therefore satisfied that this factor does not raise any specific concerns which would impact this determination.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

- existing lumber and pulp mills

Approximately 80 percent of the timber currently harvested in the North Coast TSA is suitable for processing as sawlogs, with the remainder processed by pulp or chip mills. Thirty percent of the timber harvested is processed within the TSA, with the majority sent to other coastal and lower mainland mills. Most of the mills within the TSA are in the vicinity of Prince Rupert, where timber originating from the TSA supplies approximately eight percent of Prince Rupert's total sawlog and pulp milling requirements.

Mills include Skeena Cellulose's Pulp and Paper complex in Prince Rupert, which is the only pulpwood facility in the North Coast TSA and is the area's largest employer. The pulp mill is not linked to any licence agreement in the TSA, and the majority of the chips for this mill come from TFL 1 and the Kalum and Nass TSAs. The mill currently employs about 690 people. Over the past ten years the facility has seen significant upgrades and expenditures to meet environmental regulations. The mill has two components, both of which are currently in production: an 'A' mill, which produces 285 000 tonnes of northern bleached softwood kraft pulp, and a 'B' mill, which produces an additional 165 000 tonnes of pulp.

West Fraser's North Coast timber mill is also located in Prince Rupert and is a dual purpose facility, producing custom cut lumber as well as chipping whole logs. Wood chips from this facility are sent to the Skeena Cellulose mill.

On Ridley Island is the Ridley Island Log Sort Inc. facility which is involved in wood chipping, milling, log trading and sorting. The facility has an agreement with Skeena Cellulose to supply 16 000 cubic metres per month of chipped fibre, and has almost doubled its employment in the past couple of years. There are also several small facilities near or in Prince Rupert which utilize small volumes of primarily western redcedar in the production of various products such as patio furniture or custom ordered shakes and shingles.

I have reviewed the information presented regarding existing facilities and am aware of no issues which might be of concern to this determination.

- proposed processing facilities

A preliminary proposal has been submitted to the BCFS for a red alder transformation chip plant in Prince Rupert, with supply coming from the Queen Charlotte, Mid Coast, North Coast and Kalum Forest Districts. However, district staff note that an inventory of red alder within these districts is still required to determine overall availability, suitability

and feasibility of harvesting this resource. The red alder resource in the North Coast TSA is discussed earlier in this rationale under *deciduous species*.

A small value added processing plant was partially completed in Prince Rupert in 1997, but economic difficulties forced the developer to abandon the project. District staff are uncertain about the future status of this processing facility.

There are no other processing facilities proposed for the North Coast TSA. I am satisfied from reviewing the information and from discussions with district staff that there are no issues which would impact this determination.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Economic and social objectives

- Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4).

This letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination of an AAC for the North Coast TSA. I note that the current age class distribution of the stands in the TSA precludes a commercial thinning management regime at this time, as there is a low proportion of stands in the appropriate age class for commercial thinning. This, combined with the terrain and access limitations prevalent in the TSA, lead me to conclude that commercial thinning cannot be recommended at this time.

I have also considered a partition, and have discussed this in greater detail under *partitions*.

- local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

Public input was received to both the data package and analysis report for the North Coast TSA from individuals, regional districts, licensees, First Nations and interest groups. Wherever possible, I have attempted in the appropriate sections of this rationale to respond briefly to the views expressed, and consideration of this input has been an important component of this determination. I note that some of the input received relates to items beyond the scope of the timber supply review and my mandate to consider under section 8 of the *Forest Act*.

Some of the public input received relates specifically to objectives of the local communities regarding the harvest levels in the North Coast TSA. The Skeena Queen Charlotte Regional District expressed support for management practices leading to maximum long-term sustainable benefits to local communities. In particular, they are in support of the processing of wood products locally, and mention that they are not in support of exporting raw logs.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Abnormal infestations and salvage

- unsalvaged losses and salvage program

Unsalvaged losses are timber volumes destroyed or damaged by causes such as fire and disease that are not recovered through salvage operations. There are a number of parasites, fungi or plants that can kill trees or degrade the quality and value of logs.

Estimates for unsalvaged losses account for epidemic (abnormal) infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in inventory sampling for existing timber yield estimation or though other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted under *volume estimates for managed stands*.

The estimate for average annual unsalvaged losses at the time of the 1995 determination for the North Coast TSA was 2034 cubic metres per year. This estimate accounted solely for losses due to fire and is a 20-year average loss of timber volumes. No estimates were available for losses due to wind, insects or other pests. The loss estimate was again applied in the 1999 timber supply analysis as no better information was available at the time the analysis was initiated.

At the time of the 1995 determination, it was believed that unsalvaged losses may have been underestimated, in particular when compared to estimates for other coastal units. The rationale for that determination included an instruction for district staff to attempt to resolve this uncertainty. A study was undertaken to attempt to better quantify the losses resulting from blowdown, and a report was completed in 1998 which estimated losses of 13 417 cubic metres per year. However, Timber Supply Branch staff questioned the estimates provided in the report, noting that the estimates applied to a larger land base than the timber harvesting land base used in the analysis. Staff reviewed the report,

including the methodology, and the blowdown estimate was adjusted to 8050 cubic metres per year to reflect unsalvaged losses on the timber harvesting land base. Due to the timing of the information, the estimate for blowdown losses was not used in the timber supply analysis.

District staff indicate that losses due to insects and other pests in the North Coast TSA are strictly endemic in nature which are accounted for—as mentioned elsewhere in this rationale—by operational adjustment factors and by decay, waste and breakage factors. Dwarf mistletoe and spruce aphids are present at endemic levels in the TSA.

I have considered the information regarding unsalvaged losses and am satisfied that it is appropriate in the North Coast TSA to account for losses due to both wind and fire. The assumptions applied in the analysis regarding losses due to fire are appropriate and reflective of current field conditions. With regard to blowdown losses, I accept the assessment of Timber Supply Branch staff and will take into account the timber supply impact of an additional 8050 cubic metres per year loss due to blowdown. I will discuss this further in my 'Reasons for decision'.

Reasons for decision

As discussed in this rationale, it is appropriate for me to take into account those factors which differ from the analysis assumptions and in my estimation present some risk to timber supply. Of the factors discussed under section 8 of the *Forest Act* in this rationale, there are those that indicate the timber supply as projected in the base case may be overestimated and those that indicate it may be underestimated. My considerations of these factors are discussed below.

There are several factors that indicate that the timber supply as projected in the base case is overestimated to a degree that can be approximately quantified. The first of these factors is as follows:

- *Nisga'a Lands*: the transfer of lands from the North Coast TSA to Nisga'a ownership results in a reduction of approximately 61 000 hectares to the total TSA land base and a reduction of 5354 hectares from the timber harvesting land base.

This factor specifies the permanent withdrawal of land from the North Coast TSA. I will account for it through an explicit reduction to the AAC. As discussed under *Nisga'a Lands*, I have reviewed the methodology used to derive the timber supply contribution of 25 600 cubic metres per year assumed to be associated with those lands—the amount by which I reduced the AAC in May 2000 under the authority of Part 14 of the *Forest Act*—and believe it to be sound and reasonable for use in this determination. As a result, in this determination I will permanently account for the smaller TSA land base by reducing the AAC to 574 400 cubic metres, and for the remainder of my determination I will use this harvest level as the basis against which to assess timber supply impacts resulting from the various other factors. This decision acknowledges the explicit intent to maintain a harvest level on the transferred Nisga'a Lands.

There are some additional factors which indicate that the timber supply as projected in the base case is overestimated to a degree that can be approximately quantified, as follows:

- *woodlot licences*: the issuance of woodlot licences since the previous determination which were not accounted for in the analysis results in a 776 cubic metre per year overestimation of timber supply. I will take this into account, and by doing so will also account for the permanent removal of 400 hectares from the land base.
- *timber licences*: a very slight overestimation of short-term timber supply resulting from 129 hectares included in the timber harvesting land base from the start of the analysis horizon;
- *unsalvaged losses*: an additional 8050 cubic metres per year is estimated to be lost due to unsalvaged blowdown;
- *identified wildlife*: an additional reduction to the size of the timber harvesting land base of one percent is required to provide for identified wildlife habitat;
- *TSA boundary changes*: adjustments to the district boundary as well as to the TSA boundary result in a net reduction of 1667 hectares or 1.4 percent of the timber harvesting land base.

I will reduce the AAC by an additional 776 cubic metres per year to account for the newly issued woodlot licences and the corresponding removal of 400 hectares from the land base. In consideration of the bounds of uncertainty around the other factors listed above, I estimate the total influence on timber supply to be a downward pressure of approximately 4.9 percent in the short- and long-term.

In addition, there is one factor for which the risks posed to timber supply are less well quantified. I am mindful that the uncertainty around the volume estimates for existing stands, which has to a large extent been addressed by the reinventory, has only partly been accounted for in the 1999 timber supply analysis. The potential risk posed to timber supply as a result of uncertainties in this factor is an up to 20 percent overestimation of yields on one third of the timber harvesting land base assumed in the analysis. Sensitivity analysis results indicate that harvest levels are sensitive to uncertainties in the existing stand yield estimates in the short- to mid-term. In light of the potential risks to timber supply, and in order to provide some better quantification of the risks around this factor, I requested additional analysis from BCFS staff.

For those stands on the timber harvesting land base whose yields were projected in the timber supply analysis using the old inventory data, Timber Supply Branch staff compared the estimates for existing stand yields projected by old inventory data to those projected by the now-complete new inventory. The results indicate that the average yield after reinventory is approximately 9 percent less than that projected by the older data. From these results, it is reasonable to project that there may be an up to 9 percent overestimation of volumes for stands on one third of the timber harvesting land base, or a 3 percent overestimation in timber supply as a result of this factor. This downward influence acts largely in the short-term.

In consideration of those factors acting to decrease timber supply, I estimate the net result to be a 7.9 percent downward influence on timber supply in the short-term. I am satisfied from review of the information, including the sensitivity analysis in which the timber harvesting land base was reduced by 10 percent, that the base case initial harvest level is

sufficiently stable in the short-term to be maintained for one decade even in the face of a 7.9 percent downward pressure.

Also in my considerations, I am aware that there are some factors which indicate timber supply might be more favourable than projected in the base case. Those that are quantified are small, and act primarily in the long-term:

- *existing roads, trails and landings*: 546 hectares underestimation in the size of the long-term timber harvesting land base (0.5 percent); and
- *timber licences*: a slight underestimation in long-term timber supply resulting from 259 hectares excluded in the analysis (0.2 percent).

There are some other factors whose influence on timber supply is not quantified at this time, but which potentially indicate more stable supply than depicted in the base case harvest flow. The first involves the uncertainty around minimum harvestable ages, which are significantly sensitive to the 35 centimetre minimum diameter limit. Sensitivity analysis results indicate that timber supply is very sensitive to minimum harvestable ages. A review of the minimum harvestable ages assumed in the analysis would appear to indicate that the ages are largely overestimated, and analysis indicates this is most significantly influenced by our inadequate data on the site productivity of managed stands. A less constraining view would indicate significantly more timber is available than projected in the base case. If the site productivity of managed stands in the TSA proves to be greater than that projected by estimates based on existing stand attributes—and this has been shown to be the case in many other management units in the province—then the potential exists to massively offset any downward pressures on timber supply. I am convinced managed stands have higher site productivity than indicated by measurements based on existing old growth stands. It is not clear whether the numbers would be as high as indicated by the sensitivity analysis, but it provides some approximation of potential impacts to timber supply. While the bounds of uncertainty can only be removed through obtaining local data, timber supply is undoubtedly more favourable than projected in the base case on account of this factor alone. To attempt to resolve this uncertainty for future determinations, I have requested that more work be done by BCFS staff.

Given the potential of improved site productivity information for managed stands to offset mid-term declines in timber supply, and given the uncertainty around the existing stand yield estimates for the one third of the land base with the old inventory, I requested additional analysis from Timber Supply Branch staff in an attempt to better quantify some of the uncertainty. Sensitivity analyses were conducted to assess the potential of site productivity adjustments to offset the reductions in existing stand yield estimates which will likely occur for that portion of the timber harvesting land base for which volumes were estimated using old inventory data. In the first sensitivity analysis, in which existing stand yields were reduced by 10 percent and only the paired plot OGSI site productivity adjustments were applied, the initial harvest level projected in the base case could be maintained for six decades before declining by 19 percent to 488 000 cubic metres per year, and then increasing again to 605 000 cubic metres per year in decade 14. The second sensitivity analysis tested the impact of a five percent reduction in existing stand

yields and the application of only half the site productivity adjustment indicated by the OGSI studies. In this sensitivity analysis, the initial harvest level could be maintained for six decades before declining to 486 000 cubic metres per year.

The results of these sensitivity analysis give me some indication of the risks posed to timber supply by the uncertainty in existing stand yield estimates, and the potential of better site productivity estimates to offset these risks. In consideration of the information presented, I am satisfied that the cumulative influence of the factors discussed above on their own merits do not cause me to believe any further reduction is warranted at this time, beyond those already mentioned.

There are two additional issues influencing my determination of harvest level in the North Coast TSA. The first issue is the lack of harvesting performance on two portions of the timber harvesting land base. For the area north of the Nass River, which contains 12 percent of the timber harvesting land base, there has been little harvesting activity over the past 20 years. For the highly visually sensitive areas (i.e., those areas with recommended VQOs of preservation, retention or partial retention) which comprise 15 percent of the timber harvesting land base, there has been little demonstrated performance. These two portions of the land base, which do not overlap, contain 27 percent of the land base assumed to contribute to timber supply in the North Coast TSA. I am concerned about the lack of performance in both of these areas and the risks posed to timber supply by the lack of evidence of operations on nearly 30 percent of the land base. The consequence of this lack of activity is that 100 percent of current harvest originates from 70 percent of the area, which may pose increasing risk to maintenance of timber supplies as well as to meeting stewardship objectives.

I am also mindful of the continued deferral of harvest from the protected area study areas in the North Coast TSA, and of the implications arising from the CCLCRMP discussions. Consistent with my guiding principles, it is not appropriate for me to take into account in a determination the exclusion of these study areas until a decision is reached by government on their future status. However, as mentioned elsewhere in this rationale, the district manager may choose to recommend to Cabinet official designation of these areas under Part 13 of the *Forest Act*. If Cabinet chooses to so designate an area, then Part 13 of the *Forest Act* also allows me to temporarily reduce the AAC in a unit where a designated area exists, through written order. This process may be an option in order to ensure resource stewardship objectives in the remainder of the TSA are not compromised.

I am concerned about establishing a partition in the North Coast TSA, given the administrative difficulties associated with partitions, as well as adjustment period required for both licensee and BCFS staff. However, I am convinced that it is not responsible to continue to develop the land base at the current rate without confirmation that nearly 30 percent of the land base is viable for operations. As a result, I feel obliged to reflect this concern in this decision by establishing a partition.

I therefore determine it appropriate to institute a partition in the North Coast TSA. This partition is to the highly visually sensitive areas (that is, areas with preservation, retention and partial retention VQOs), and to the portion of the land base north of the Nass River. These two components of the land base in total comprise approximately 27 percent of the

land base assumed to contribute to timber supply in the TSA. A partition which reasonably reflects the assumed contribution from the stands on these portions of the land base is 154 000 cubic metres per year.

In recognition of the challenges represented by partitions, both to licensee in terms of planning and to BCFS staff in administering the partition, I am setting one partition which encompasses both of these areas. I expect that the harvested volume contribution from each area within the partition will, over time, approximately reflect the proportion of the land base in each area, such that the proportion of volume from the North and from the highly visually sensitive areas will approximate 45 and 55 percent, respectively, of the total volume of the partition.

I believe that it is important to validate across market cycles whether we are describing a responsible land base for the North Coast TSA. I request that district staff monitor the performance in the partitioned stands over the time that this determination is in effect, and report on this performance, such that I can comprehensively review the information at the next determination. If monitoring shows continued lack of harvesting performance in the partitioned areas, then I may consider it appropriate to remove these areas from contributing to timber supply in a future determination. However, I am aware that it will likely take a period of time to overcome the initial challenges associated with the establishment of this partition. I will be mindful of this when reviewing the performance in the partition, and in considering future timber supply implications of any lack of performance, in the next determination for the North Coast TSA. I leave the administration of the partition to the district manager, but request that he recognize the market sensitivity and the logistics associated with its administration in his actions.

As mentioned previously, I will also account for the removal of 776 cubic metres on account of newly issued woodlots in the North Coast TSA.

Lastly, an issue discussed in this rationale for which I am not explicitly accounting at this time is that of the merchantability of red alder as a commercial species. If this uncertainty can be resolved prior to the next determination, then it may be possible for me to account for some contribution to timber supply from these stands at that time, which would serve to provide greater stability to timber supply in the North Coast TSA.

Determination

I have considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the North Coast TSA by establishing an AAC of 573 624 cubic metres, which includes one partition of 154 000 cubic metres to the following two portions of the TSA:

- that portion of the TSA which lies north of the Nass River, and
- that portion of the TSA which is considered highly visually sensitive (with recommended preservation, retention or partial retention VQOs).

This AAC excludes the volume issued to woodlot licences.

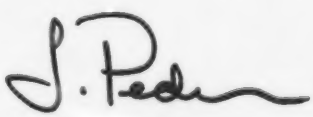
This determination is effective January 1, 2001, and will remain in effect until a new AAC is determined, which must take place within five years of the effective date of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the North Coast TSA. I recommend that district staff:

- improve the data for soils sensitivity and slope stability, including additional collection of terrain stability data;
- monitor harvesting performance in the partitioned stands in the northern portion of the TSA;
- monitor harvesting performance in the partition to highly visually sensitive areas;
- work with licensees to collect better information on permanent site productivity loss estimates for future roads;
- obtain improved site productivity information for the managed stands in the TSA;
- continue to monitor damage to second growth stands from porcupine feeding;
- continue to evaluate the potential for an increased juvenile spacing program;
- work to improve available data on the occurrence of and management practices for cultural heritage resources; and
- obtain local data to better reflect practices in riparian management zones.



Larry Pedersen
Chief Forester
October 12, 2000

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and
(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or
(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and
(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and
(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and
(b) different types of timber and terrain in different parts of private land within a tree farm licence area.
(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and
(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,
(ii) the expected time that it will take the forest to become re-established on the area following denudation,
(iii) silviculture treatments to be applied to the area,
(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,
(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and
(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;
(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;
(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and
(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: The Crown's Economic And Social Objectives Regarding Visual Resources

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis.*

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

North Coast Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests
North Coast Forest District
125 Market Place
Prince Rupert, BC
V8J 1B9

October 12, 2000

This is a summary of the public input received on the Timber Supply Review in the North Coast Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Background

As part of the review of timber supply in the North Coast Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the North Coast TSA *Data Package* and *Information Report* in February 1998. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the North Coast TSA. A 30-day review period, ending March 16, 1998, was provided for the public to comment on these documents.

On November 24, 1999, the British Columbia Forest Service released the 1999 North Coast Timber Supply Area Analysis Report and Public Discussion Paper. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 60-day review period that ended January 28, 2000.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the North Coast TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the Freedom of Information and Protection of Privacy Act) can be reviewed at the North Coast Forest District office.

Public Review Process and Response

North Coast Forest District staff actively solicited public input on the Timber Supply Review in the North Coast TSA through the following actions:

- the Information Report, Public Discussion Paper and Analysis Report were mailed to First Nations, licensees, forest workers, the Chamber of Commerce, environmental groups and local government in the North Coast TSA with a cover letter indicating that district staff were available to meet to discuss questions or concerns.
- the Data Package and Analysis Report were available at the forest district office in Prince Rupert and the regional office in Smithers.
- First Nations in the North Coast TSA were contacted by phone to offer meetings, as was the mayor of Prince Rupert.
- meetings regarding both the *Data Package* and *Analysis Report* were held with representatives from First Nations, the MLA, the forest industry and other interest groups.
- local media were provided with news releases. An article was published March 1, 1998, in the *Prince Rupert This Week.*

As Table 1 shows, about 12 individuals attended information sessions or meetings. The North Coast Forest District also received five written submissions on the *Data Package* and eight submissions on the *Analysis Report* (see Appendix 1).

Activity (# of participants)	Date
Elected officials	
MLA (1)	Feb. 12/98 & Nov. 23/99
Interest groups	
Prince Rupert Environmental Society (1)	Feb. 28/98
First Nations	
Lax Kw'alaams Consultation Process Mtg. (8)	March 18/98 Jan. 18 & Feb. 11, 2000
Nisga'a Nation (1)	
General Public	
One individual	Dec. 13/99

Table 1: Participation in public information activities

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the North Coast Timber Supply Area is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and Public Discussion Paper)
- Other comments

Data Package

Operable Land Base

Interfor requests that its operability updates, based on recently awarded chart areas, be included in this timber supply review as reflecting current practice. The company says its plans include a high number of height class 3 and lower cedar stands as operable. While agreeing that height class 2 stands or less are currently inoperable, the company recommends that if the inclusion of class 3 stands is problematic, a partition should be established as a performance-oriented area, as in the Mid Coast TSA.

The Prince Rupert Environmental Society questions the use of 620 m^3/ha as the average cut in this TSA and says surveying licensees to achieve this figure is a flawed methodology. The society questions whether that figure includes low productivity sites which make up 68 per cent of the area, since harvesting has been concentrated in good and medium sites. The society also says more justification is needed for the use of a logging cost of $100/$m^3$ in defining economic operability.

Land Base Reductions

Interfor says the 100 per cent reduction from the land base of areas categorized as Es1 (high soil sensitivity) should be reviewed. The company says the expansion of heli-logging supports this request, pointing to the reduced risk from road-building and the increase in areas available for heli-logging if they weren't withdrawn as Es1.

Interfor also questions the land base reduction of 25 per cent in Ew1 areas (high wildlife sensitivity) to account for goat habitat at mid-elevations. The company says in the last Timber Supply Review, only 5.9 per cent of the land base was available for harvesting, leaving considerable area for wildlife.

Interfor's submission also addresses the withdrawal of land from the harvesting land base to account for roads, trails and landings. The company says the proposed netdown of 8.4 per cent is excessive and should be four per cent, citing research that shows productivity loss is on average one-half of site degradation, due to canopy closure over the roads. Interfor also points to other coastal areas where road netdowns range from four to seven per cent.

Expected Rate of Growth and Productivity

Interfor expresses the opinion that the results of the Old Growth Site Index project should be used in the base case, noting the chief forester's statement in a Vancouver Sun article (March 25, 1999) that this information will begin to be incorporated into the current Timber Supply Review.

Interfor also says analysis units must be further divided to more accurately capture the growth rates of different species groupings. For example, cedar should be split by good, medium and poor sites.

Minimum Harvestable Age

Interfor recommends that a sensitivity analysis be done around the minimum average stand diameter (greater than 30 cm) required to achieve harvesting eligibility.

Regeneration Practices

An individual submission says a more concerted focus on reforestation is needed, noting that areas left to naturally regenerate often do not do so quickly enough to prevent soil erosion. This submission says the very high rainfall in this area means a different approach to reforestation is needed, compared to other areas of B.C.

Interfor notes they will review their records to assess the historic split between planting and natural regeneration.

Visual Quality

The Prince Rupert Environmental Society says it is pointless to sacrifice tourism potential to short-term clearcuts. The society says more information and more community input is needed to determine visual quality objectives.

Interfor says they will review the current landscape inventory to assess the overall impacts on timber supply. The company asks how the North Coast District is achieving the visual quality buyback directed by the chief forester.

Fish and Wildlife

The Prince Rupert Environmental Society notes that no provision is made for the protection of endangered species or communities, such as three red-listed community types that are Sitka spruce associations. The society is also concerned that North Coast streams are not being protected, especially the headwaters that are so important for coho salmon.

Riparian Areas

Noting the high rainfall in this area, an individual submission says the areas left unlogged in riparian reserve zones do not seem large enough to prevent erosion and flooding of rivers and streams, and damage to fish habitat and recreational uses.

Interfor recommends a review of localized conditions in the North Coast TSA to validate coastal averages for riparian zones, and states their willingness to contribute to such a study.

Socio-Economic Factors

An individual submission says 1991 census data may not accurately reflect the recent, rapid growth of tourism in this area and the associated growth in tourism-related employment.

Timber Supply Area Analysis Report

Existing Volume Estimates

The Hartley Bay Band Council expresses surprise that a more thorough analysis of estimates of existing stand volumes hasn't been done, considering the sensitivity of harvest levels to this factor. The Council recommends the use of statistical power analysis to assess the results of the inventory audit and perhaps yield more definitive results than those achieved by the standard analysis methodology.

Size of the Land Base

The Hartley Bay Band Council question whether the size of the timber harvesting land base accurately reflects operational planning realities. The Council points to licensee requests for volumes that greatly exceed current allocations, apparently due to uncertainties in the market but also in the impact that site assessments and operational planning procedures will have on the availability, size and configuration of approved cutblocks. The Council says, if this is true, it should be accounted for in the analysis by reviewing recent operations to assess land base withdrawals for terrain and gully instability, wildlife tree reserves, riparian areas and archeological site preservation.

Operable Land Base

An individual submission questions the use of a logging cost of $\$100/m^3$ as the cut-off for economic operability. While that figure was acceptable in 1994, the individual says it is questionable in 1999 given that only about two-thirds of the AAC has been logged in each of the past four years. Use of the $100 figure has added about six per cent to the land base, mainly low value forests, according to this submission.

Problem Forest Types

The issue of inclusion of red alder as a commercial species is addressed in a submission from John Kendall Forestry Consulting that was endorsed by eight B.C. wood manufacturing companies. The submission says in the U.S. Pacific Northwest the use of red alder has become a billion dollar a year industry, and it is time to re-evaluate the species' potential in B.C. To accomplish this, the submission recommends that the ministry of forests take steps to determine if a large enough volume of merchantable quality red alder exists and then consider creating an AAC allocation for it.

Expected Rate of Growth and Volume Estimates

A submission from West Fraser Mills says the long-term yield indicated in the timber supply analysis for the North Coast TSA (3.24 m^3/ha/year) is less than half the yield on TFL 41. The submission says the likely underestimation of future stand productivity needs to be highlighted more, because the current estimate is misleading and uncertain.

Environmentally Sensitive Areas

Since slope gradient is only one factor in defining slope stability, and since stability assessments are only required on slopes over 60 per cent, an individual submission is of the opinion that the land base has been overstated by the inclusion of Es1 and Es2 areas (high and moderate soil sensitivity). This individual suggests the North Coast District do a terrain stability study of its working forest as was recently done in the Kalum TSA.

Partition

An individual submission says the data in the *Analysis Report* show that harvesting in poor quality cedar-hemlock stands has been avoided, particularly in the past 22 years. The individual says by area these stands represent about 27 per cent of the working forest and by volume about

20 per cent. A partition of 150 000 m^3 to come from the poor quality and more expensive sites is recommended by this submission.

Socio-Economic Impacts

The Skeena-Queen Charlotte Regional District says it supports practices that maximize long-term sustainable benefits to communities within the North Coast TSA. The regional district supports local hiring practices for logging operations and local processing of wood from the TSA. The regional district says it does not support the continuation of raw log exports out of the TSA.

Other Comments

Many submissions commented on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Planning Processes

The Prince Rupert Environmental Society says an LRMP is needed for the North Coast.

Great Bear Rainforest

Two individual submissions urge protection of this area, due to its importance in Canada and internationally. One individual notes that the sensitive valleys that will be logged are only a small portion of the overall area, but are important for salmon and bear habitat, biodiversity and climate regulation.

Harvest Levels

An individual submission says the AAC should be set at the long-term harvest level immediately, for both economic and environmental reasons. These include the growth of tourism and eco-tourism (that would be harmed by the proposed harvest level); the presence of endangered and threatened species; unresolved First Nations land claims; and the responsibility to protect the habitat of Kermode bears and salmon.

Appendix 1

Submissions received by the North Coast Forest District

Submissions received on the Data Package

Industry

International Forest Products Ltd. (3 submissions)

Interest groups

Prince Rupert Environmental Society

General public

One individual submission

Submissions received on the Timber Supply Analysis Report

First Nations

Hartley Bay Band Council

Local government

Skeena-Queen Charlotte Regional District

Industry

West Fraser Mills

Consultants

John Kendall Forestry Consulting, Irv Penner

General public

Four individual submissions